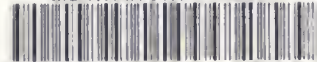


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TYLER CREEK TIMBER SALE
ENVIRONMENTAL ASSESSMENT

STATE DOCUMENTS COLLECTION

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Missoula Unit
Southwestern Land Office
Montana Department of Natural Resources and Conservation

CHAPTER I - PURPOSE AND NEED

Project Need/Purpose of Action:

The lands involved in this proposed project are held by the State of Montana in trust for the support of specific beneficiary institutions. These include public schools, state colleges and universities, and other specific state institutions such as the school for the deaf and blind (Enabling Act, February 22, 1889; 1972 Montana Constitution, Article X, Section 11). The Board of Land Commissioners and Department of Natural Resources and Conservation (DNRC) are required by law to administer these trust lands to produce the largest measure of reasonable and legitimate return over the long run for these beneficiary institutions (Section 77-1-202, MCA). On May 30, 1996, the Department released the Record of Decision on the State Forest Land Management Plan (SFLMP). The Land Board approved the SFLMP's implementation on June 17, 1996. The SFLMP outlines the philosophy of DNRC for the management of state forested trust lands, and lists specific Resource Management Standards for ten resource categories.

The Department will manage the lands involved in this project according to the philosophy and standards in the SFLMP, which states the following:

Our premise is that the best way to produce long-term income for the trust is to manage intensively for healthy and biologically diverse forests. Our understanding is that a diverse forest is a stable forest that will produce the most reliable and highest long-term revenue stream. ... In the foreseeable future timber management will continue to be our primary source of revenue and our primary tool for achieving biodiversity objectives (MDNRC, SFLMP, Record of Decision [ROD-1], 1996).

Location: Section 36 T11N R15W, Granite County

The proposed sale is located in the Tyler and Harvey Creek watersheds of the Clark Fork River; approximately 13 miles west of Drummond, Montana. The project is located on 640 acres of state trust land. Most of the forested stands in the proposal area meet DNRC's working definition of old growth—at least 150 years old (140 years for lodgepole pine), at least 4 thousand board feet (4 MBF) net per acre, and having structural attributes associated with old age. (For more information, see Chapter 3 of this document, Old Growth). Old growth stands are composed of Douglas-fir, ponderosa pine, and western larch/Douglas-fir cover types (Figure 1-1). Only 3 stands in the section (total of 55 acres) are younger than 150 years, and these are classed as 100-149 years. Unlike neighboring areas, the section has not been logged in the past. Therefore, natural successional processes have been allowed to proceed without the removal of large-sized trees or other habitat components. However, the area has experienced fire suppression in the past 50-80 years, so that the understory is denser now than would have been expected with historic fire regimes. The largest, oldest Douglas-fir trees show fire scars, indicating that non-lethal burns have occurred in the area. Several trees were bored and found to be over 200 years old. Two stands (a total of 50 acres) are doghair lodgepole, indicating hotter burns occurred in those areas (Figure 1-1). The section has 1.3 miles of road, built recently (1995) to access neighboring Plum Creek Timber Co. land.

Project Objectives:

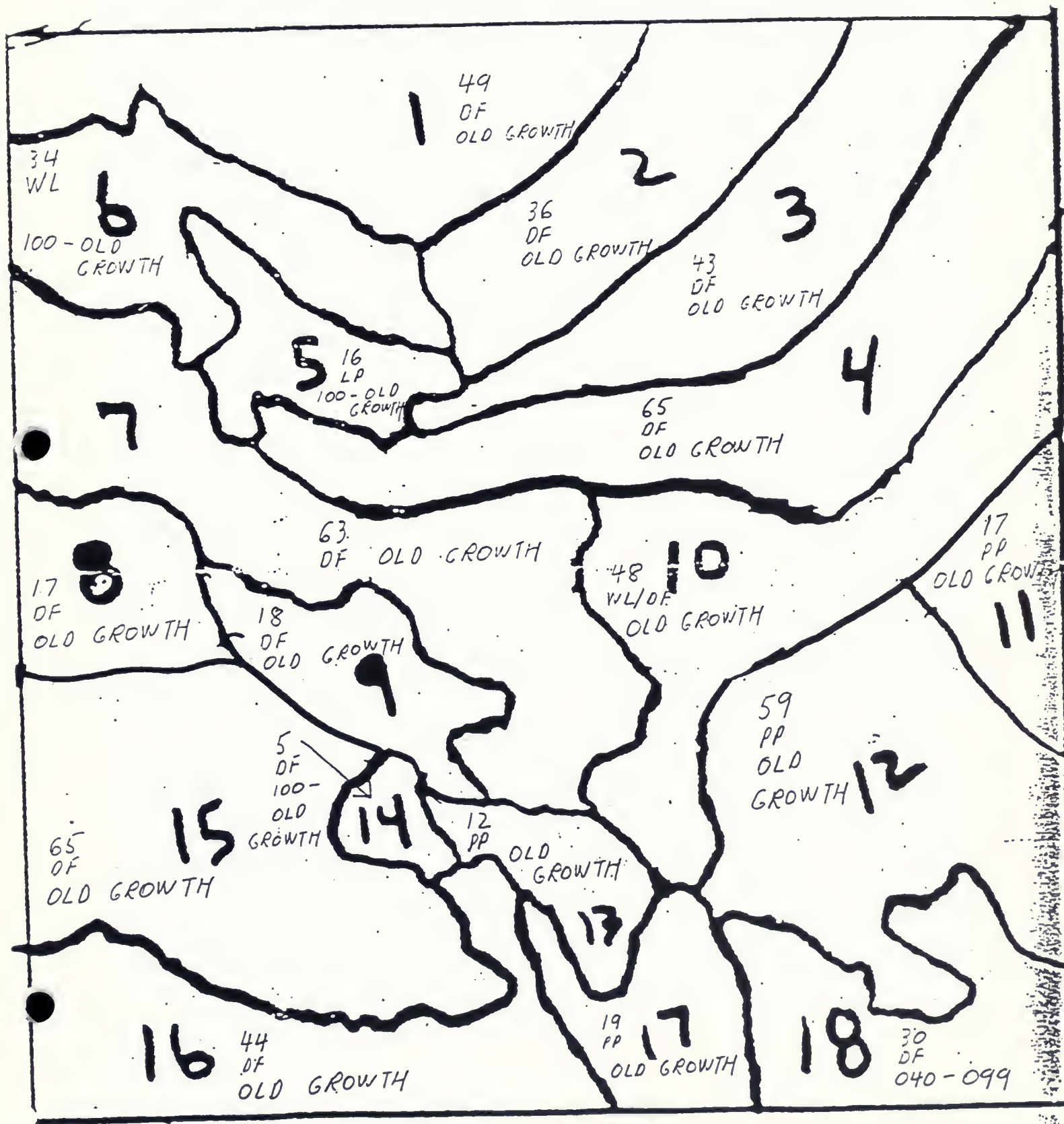
In order to meet the goals of the management philosophy adopted through programmatic review in the SFLMP, the Department has set the following specific project objectives:

1. Harvest between 1.5 and 3.0 million board feet (MMBF) of sawtimber to generate a net positive rate of return for the Common School (CS) grant.
2. To manage the forest for appropriate or desired future conditions, characterized by the proportion

STAND MAP

FIGURE 1-1

ACRES - 117
COVER TYPE - DF
STAND AGE - 100-150



and distribution of forest types and structures typical of those represented under average historic conditions.

Relationship to the State Forest Land Management Plan:

In June 1996, DNRC began a phased-in implementation of the SFLMP. The SFLMP established the agency's philosophy for the management of forested trust lands. The management direction provided in the SFLMP comprises the framework within which specific project planning and activities take place. The SFLMP philosophy and appropriate resource management standards have been incorporated into the design of the proposed actions.

Other Environmental Analyses Related To This Project:

Harvey-Eightmile Timber Sale Final Environmental Impact Statement, 1991, U.S.D.A. Forest Service, Deerlodge National Forest, Butte, MT

Flat-Pardee, Tarkzeau, and West Lubrecht EAs, Missoula Unit, Southwestern Land Office, DNRC. The West Lubrecht EA covers 3 timber sales: West Lubrecht, Greenough, and Potomac.

Permits, Licenses and Other Authorizations Required:

Other state or federal agencies that have jurisdiction or review responsibility are as follows:

1. U.S.F.S. – Easement for road.
2. Plum Creek Timber Co.—Reciprocal Access Agreement.
3. 124 Permit (see mitigation measures and Chapter 4, Water Quality).

Decisions To Be Made From This EA:

1. Determine if alternatives meet the objectives of the project.
2. Determine which alternative should be selected.
3. Determine if the selected alternative has a significant impact on the human environment.
4. Determine if an Environmental Impact Statement (EIS) is required.

Public Involvement - Agencies, Individuals or Groups Contacted:

Comments from the general public, interest groups and agency specialists were solicited as part of this EA. Legal notices were run in the Missoulian on July 31, August 7 & 14, 1998. Public notices were posted from early August to September 15 at the post offices and local grocery stores in Drummond and Clinton with additional postings at the Bearmouth Chalet and the locked gate at the bottom of Tyler Creek. Scoping notices were sent to all individuals and organizations on Missoula Unit's list of interested parties and the grazing lessee for the parcel. Two written comments were received. One was from F.H. Stoltze Land & Lumber Co. and one was from the Montana Wood Products Association. Both comments encouraged timber harvest within the project areas and analysis of rate of return and cost effectiveness of work required in any subsequent timber sales.

Issues:

The following issues were identified during the scoping process. They constitute the basis for the formation of project specifications, development of mitigation measures, and assessment of environmental impacts.

Wildlife-related Issues

Old Growth: Timber harvest and associated roadbuilding can remove components of old growth, reduce or eliminate the function of old growth habitat, and disrupt the processes that produced and maintain old growth over time. As a result, habitats can be rendered less suitable or unsuitable for species that are associated with old growth. Old growth ecosystems are complex and generally require the passage of considerable time to be recreated. Therefore, the loss of old growth habitat and its attendant wildlife species is a concern.

Overstory cover and movement corridors: Retention of overstory cover and movement corridors is a concern, because harvest removes overstory canopy cover. For some species that are associated with a high degree of canopy cover (such as lynx, fisher, and marten), harvest can render habitats unusable or less suitable. This is particularly important where overstory canopy cover has been altered over much of the surrounding landscape.

Snags and coarse woody debris: Recruitment of large-sized snags and coarse woody debris is a concern because harvest can remove trees that appear unhealthy from a timber-producing perspective. The proposal area has many large-sized trees with defects that would make suitable snag and coarse woody debris recruitment trees. These may be targeted for harvest. In addition, harvest can decrease snag and coarse woody numbers, if snags are removed for safety considerations, or coarse woody debris is broken up by equipment.

Noxious weeds: The spread of noxious weeds through soil disturbance from timber harvest and associated roadbuilding is a concern. Once introduced, noxious weeds can displace native vegetation. Noxious weeds could potentially spread to currently undisturbed areas of the section with timber harvest activities.

Road-building: In general, high road densities decrease habitat security and quality for many wildlife species, compared to similar habitats without high road densities. In addition, high road densities contribute to loss of snags and snag recruits due to firewood cutting. The presence of a road allows snowmobile access in winter, even if roads are closed to vehicle traffic with a gate. If roads are closed to vehicles, unauthorized access can occur so that security or habitat quality is compromised. Even if roads are closed, the presence of a road surface encourages foot, horse or bicycle traffic.

Water-related Issues

Water Quality:

Land management activities such as timber harvest and road construction can impact water quality primarily by accelerating sediment delivery above natural levels to local stream channels and draw bottoms. These impacts are caused by erosion from road surfaces, skid trails, log landings and by the removal of vegetation along stream channels.

Cumulative Watershed Effects:

Cumulative watershed effects can be characterized as impacts on water quality and quantity that result from the interaction of disturbances, both human-caused and natural. Timber harvest activities can affect the timing of runoff, increase peak flows and increase the total annual water yield of a particular drainage. The amount of water yield increase is proportional to the percentage of the forest canopy removed from each watershed. In

some cases, increased water yield brings about increased peak flows which may result in physical damage to stream channels, thus causing instability, loss of fish habitat and downstream water quality impacts. The degree to which these effects occur depends on the interaction of many variables including the following: soils, bedrock geology, the size and timing of storm events, harvest prescription and project design.

Cold Water Fisheries:

Land management activities such as timber harvest and road construction can impact fish habitat primarily by accelerating sediment delivery above natural levels to local stream channels and by decreasing large woody debris through the removal of recruitable trees near the stream channel.

Soils-related Issues

Concerns were raised that:

- Equipment operations during timber harvest on sensitive soils (steep slopes and wet sites) can result in soil rutting, compaction and displacement and erosion.
- Long-term soil productivity can be reduced depending on area and degree of physical effects, and amount and distribution of coarse woody debris retained for nutrient cycling.
- Soil resources may be negatively affected by road drainage. To avoid negative effects, use of proper construction and reconstruction methods that include Best Management Practices (BMPs), and maintenance of existing roads.

CHAPTER II - ALTERNATIVES

Introduction

The purpose of Chapter 2 is to describe the alternatives and compare the alternatives by summarizing the environmental consequences.

Development of Alternatives

Alternatives were planned through scoping and development of issues, input from Interdisciplinary Team (IDT) specialists, guidance from resource management standards from the SFLMP, and compliance with trust mandates. In particular, the analysis of old growth parameters drove the development of alternatives. These included a) amount of old growth, b) current and historic condition, c) juxtaposition, d) fragmentation, and e) structural attributes present (see Chapter 3, subsection "Old Growth Commitments from the SFLMP", this document). Relevant old growth biodiversity standards were #6 and #4. In addition, the IDT followed guidance regarding the preferred location of old growth (Implementation Guidance p. BIO-13, and p. BIO-23 A.1.c.). The minimum amount of old growth Douglas-fir for Missoula Unit is exceeded in all action alternatives developed. The primary reason was because the Unit-wide analysis for old growth indicated that the proposal area ranked very high in terms of the parameters listed above.

One factor that shaped the development of the action alternatives was the presence of a relatively large (6,000+-acre) roadless area adjacent and south of the proposal area. In the assessment of the IDT, this placement enhanced the habitat parameters found in the proposal area that related to large habitat blocks.

That is, the proposal area already had low fragmentation. By being located next to a large roadless area, this fragmentation was reduced even further. Similarly, the proposal area already had a large patch (550+-acres) of old growth and overstory habitat. This large patch was effectively increased to more than 6,000 acres simply because it was located adjacent to a large roadless area. Likewise, this juxtaposition improved road density (low-to even lower) and habitat security (high [due to low road density] became even higher). Therefore, the IDT justified developing the alternatives so that effects to

parameters that related to large habitat blocks would be low. With this reasoning, the Missoula Unit got the "biggest bang" for their "habitat buck".

Not all IDT members agreed that nearly all of the 20+-inch d.b.h. Douglas-fir trees should be retained in both action alternatives. However, those trees are all over 200 years old, they all have thick cork-like bark, and they all have fire scars indicating that they have survived low-intensity fires in the past. Therefore, in the assessment of the project leader, these trees are indeed representative of what would have occurred on the site under average conditions. It is possible that this type of tree could have been burned and lost to the site with periodic low intensity fire. If so, the burned and lost individuals would be represented by the 20+-inch d.b.h. trees that would be incidentally removed in both alternatives, due to road placement, cable corridors, or landings. In addition, some 20+-inch d.b.h. trees would be removed on 52 acres of mixed severity fire disturbance emulation in Alternative B.

Alternatives Considered but Eliminated

An action alternative was considered that harvested fewer acres (150 acres total) but more intensively than is currently proposed. The alternative was dropped because revenues would have been low and potential negative effects to old growth attributes would have been concentrated. Another alternative was considered that resembled the current alternative B except that all harvested areas would have had most large trees removed. The IDT combined the extensive area of treatment with lighter harvest to arrive at the current action alternatives, B and C.

Alternative A: No action

Under the no action alternative, no harvest would occur at this time. Current activities such as fire suppression and livestock grazing would continue. The no action alternative can be used as a baseline to compare the environmental consequences of the action alternatives.

Alternative B: Old growth stands would have 1 of the following treatments: 1) unentered, 2) individual tree selection system, or 3) emulation of mixed severity fire disturbance. Lodgepole stands would be clearcut with scattered and clumped green trees retained.

Lodgepole stands (50 acres, all non-old growth) would be clearcut with scattered and clumped green trees retained. Residual cover in lodgepole stands would be 10-20% of the pre-harvest canopy. Stands post-harvest would resemble areas that have experienced natural disturbances.

Treatments (individual tree selection systems) that emulate mixed severity fire disturbance in old growth Douglas-fir stands would include the following: 1) areas that emulate a cool underburn; 2) areas that emulate a hotter or mixed severity burn, with patchy and more extensive crown removal; and 3) unentered areas. Treatment 1 would include 255 acres of current old growth Douglas-fir and 29 acres of non-old growth Douglas-fir. Post-harvest stands would resemble areas that have experienced a cool underburn. All trees greater than 20 inches d.b.h. would be retained, except for those that are removed incidentally for road or cable corridor placement. Otherwise, no large trees would be targeted for removal in this proposal. Most large trees are 200 year old Douglas-fir, with an occasional ponderosa pine or less frequently, western larch. Tree removal would focus on small to mid-sized (8 to 14 inches d.b.h.) understory Douglas-fir, and approximately 45 % of the current volume would be removed. Preliminary cruise data for the section indicate that old growth Douglas-fir stands currently average 10 trees > 20 inches d.b.h. per acre. Basal areas in these stands would average 80 square feet per acre post-harvest.

Where treatments emulate a mixed severity burn (#2 above), some trees >20 inches d.b.h. would be removed. Areas targeted for this treatment total approximately 52 acres and include portions of stands 1, 2, 7, and 8 (Figure 2-1). In these areas, an average of 4 trees per acre of 20+-inches d.b.h. would be

EXISTING ROAD - - - -

ALTERNATIVE B
FIGURE D-1

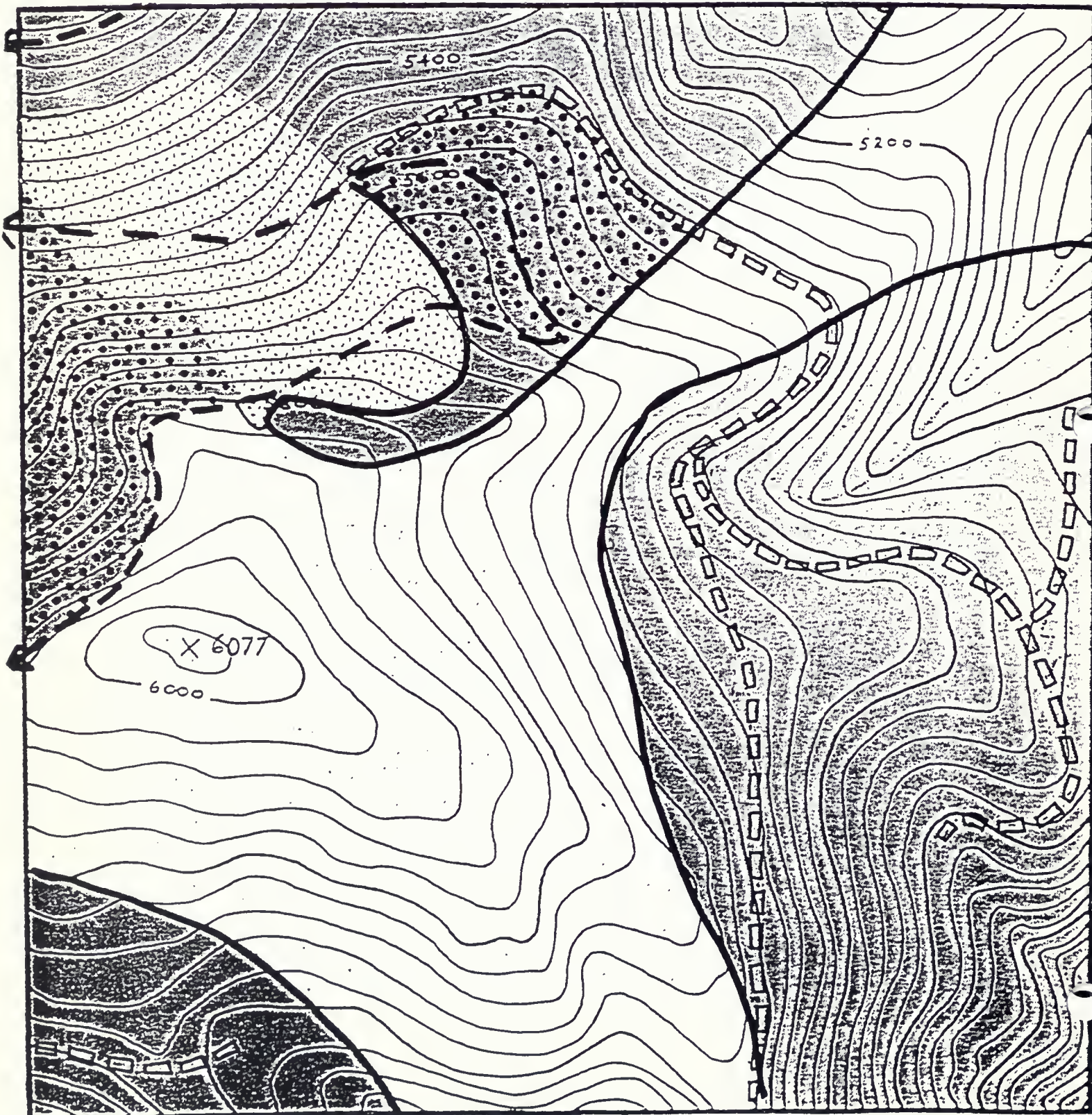
NEW ROAD □ □ □ □

LODGEPOLE CLEARCUT 10-20 SQ. FT. OF BA/AC

SELECTION CUT 80 SQ. FT. OF BA/AC

SELECTION CUT 40 SQ. FT. BA/AC

Scale: 8" = 1 mile
Contour Interval = 40'



S.D.C. 12/76

from U.S.G.S. 1959

ALTERNATIVE C
FIGURE 2-2

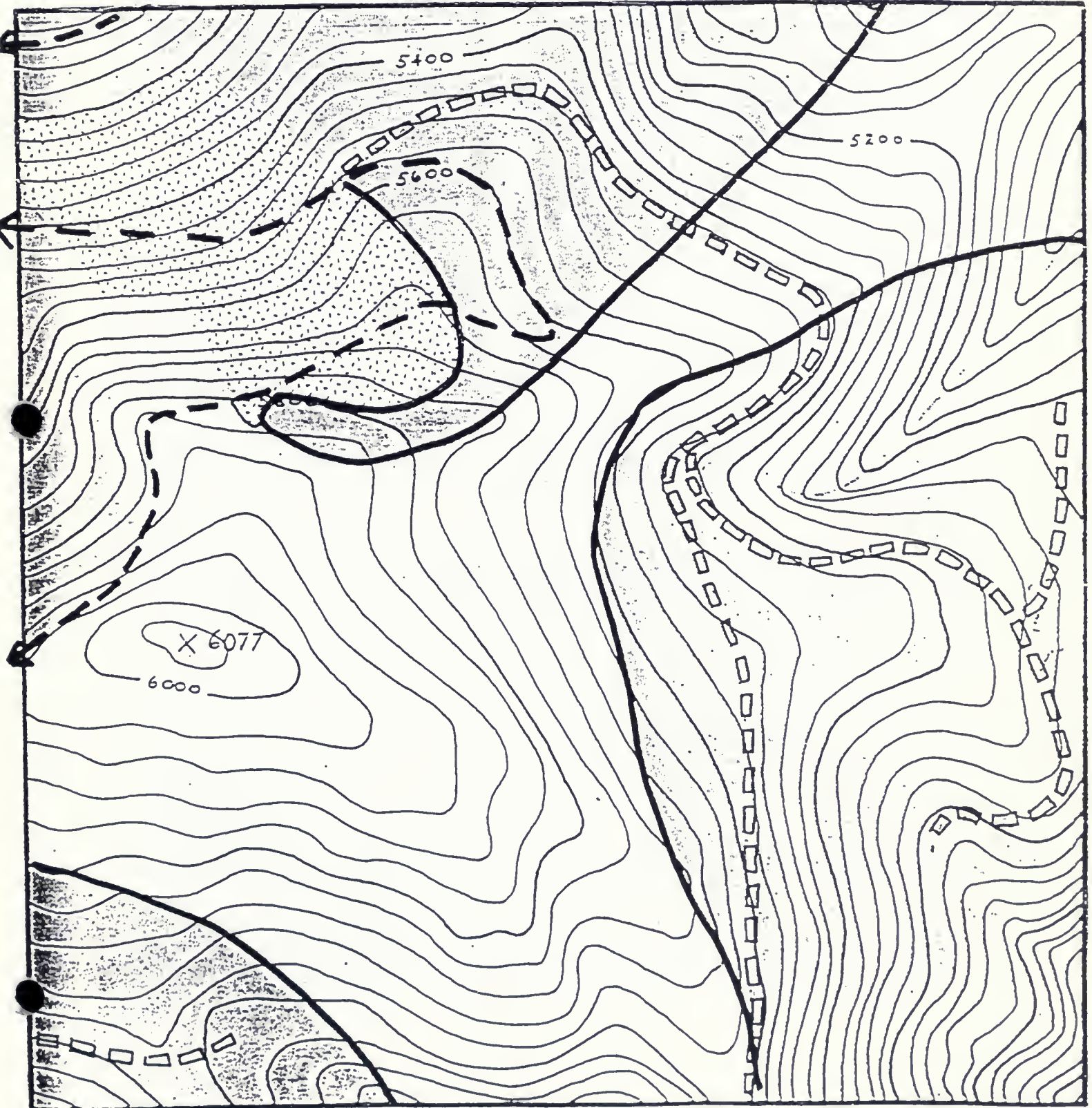
EXISTING ROAD 

NEW ROAD 

LODGEPOLE CLEARCUT 10-20 SQ. FT. OF BA/AC 

SELECTION CUT 80 SQ. FT. OF BA/AC 

Scale: 5" = 1 mile
Contour Interval = 40'



retained post-harvest. These would include green trees and culls that would be retained as relic trees throughout future entries. Basal area would be reduced to approximately 40 square feet per acre, average. These stands would have fewer old growth attributes post-harvest than pre-harvest, including lower volume, higher vigor, less structural diversity, and lower average diameter.

Unentered old growth stands (249 acres) connect areas to the northeast of Section 36 toward the Clark Fork River, with the Grouse Gulch Silver King Roadless Area south of the section (Figure 2-1). Unentered areas include ridgetops that provide potential travel corridors, and stands with high quality old growth attributes. Unentered south-facing slopes are more open grown than north-facing slopes. Five non-old growth acres would not be entered.

Total area harvested in Alternative B is 386 acres. Most of the section (238 acres) would be tractor logged; 148 acres of steep ground in 4 scattered areas would be cable logged. All entered stands would have return skidding of slash to provide coarse woody debris. Following harvest, there would be approximately 10 tons per acre of coarse woody debris. Approximately 2.5 miles of road would need to be built. Roads would be closed and slashed, that is, made un-drivable or un-walkable by placing slash on the road surface after activities are finished. Alternative B would harvest approximately 2.5 million board feet of timber, and generate \$612,500.00 (assuming an average price of \$245/thousand board feet).

Alternative C: Same treatment as B except that for all treated old growth, all trees >20 inches d.b.h. would be retained. Total area harvested is 386 acres. Treatment 1, the cool underburn emulation, would include 307 acres of old growth instead of 255 acres in Alternative B. No Douglas-fir acres would have treatment 2, the hotter, mixed severity burn emulation. In treatment 1, most retention trees are 200+ year old Douglas-fir, with an occasional ponderosa pine or less frequently, western larch. No large trees would be targeted for removal at this time except those in the way of road building or in cable corridors. Harvest would focus on small to mid-sized (8-14 inches d.b.h.) understory trees. The following details would be the same as Alternative B: 249 acres of unentered old growth; 5 non-old growth acres not entered; 50 acres of lodgepole pine that would be clearcut with scattered and clumped green tree retention; 29 non-old growth acres with treatment 1; return skidding of slash; and road building and closure.

Approximately 45 % of the current volume would be removed, mostly trees from 8 to 14 inches d.b.h. Harvest would remove 2.3 million board feet of volume and generate \$558,900 (assuming an average price of \$243.00 per thousand). Harvested portions of the section would have approximately 75 trees of all sizes per acre and 80 square feet of basal area per acre.

To compare the effects of the action alternatives see Table 2-1.

MITIGATION MEASURES COMMON TO ALL ACTION ALTERNATIVES

Watershed

- Implement Forestry BMPS as the minimum standard for all operations associated with the proposed timber sale.
- Plan, design and improve existing road systems to meet long-term access needs and to fully comply with current BMPs.
- Construct drain dips, grade rolls and other drainage features where necessary and practical to insure adequate road surface drainage. **Install and maintain all road surface drainage concurrent with new road construction, reconstruction and reconditioning.** Drain dips constructed on sustained road grades greater than 8% may require gravel surfacing to function properly. Sustained road grades greater than

10% may require installation of conveyor belt water diverters.

- Use minimum SMZ width required under SFLMP Watershed RMS # 10. These widths may be greater than those required under the SMZ Law and Rules. The SMZ widths prescribed in Watershed RMS # 10 are dependent on: the erosion potential of soils at the site, the steepness of the side slope and the presence of any topographic breaks.
- Construct additional drainage features on all approaches to draw and stream crossings to avoid concentrating runoff at crossing sites. Drainage features should be located close enough to the crossing to minimize the runoff contributing area, but at an adequate distance away from the crossing to provide for effective sediment filtering.
- Drainage features located in areas with inadequate buffer capacity should be provided with effective sediment filtration through the use of slash filter windrows, filter fabric fencing or straw bales. Note: straw bales alone may not be effective in areas with heavy concentrations of livestock or big game.
- Ditches with direct delivery to streams or ephemeral draws need to be filtered at the outlet by using slash, or filter-fabric-wrapped straw bales.
- Incorporate slash filter windrows at all draw and stream crossings requiring fills that are more than 2 feet deep.
- Rock armor both the inlet and outlet of **all cmp installations**. Provide energy dissipaters at outfall of **all cmp installations**. Rock used for armoring should average 12 inches in diameter and not less than 6 inches in diameter.
- When excavating material in and around stream and draw crossings (i.e. installing new cmps, cleaning inlets and outlets, constructing ditches, etc.) Special care should be taken so as not to cause an excessive amount of disturbance to the stream channel or area immediately adjacent to the crossing site. Excess or waste material should be disposed of at a location where it will not erode directly into the stream or draw bottom.
- Minimize road surface blading where existing surface is vegetated, except to maintain and/or construct drainage features.
- Limit road use and hauling to dry, frozen or snow covered conditions. Suspend operations when previous conditions are not met **before** rutting occurs.
- All new stream crossings, cross drains and relief culverts will require hydrologist input for design recommendations. All inlets and outlets will be rock armored and designed with slash filter windrows.
- Where feasible, rip, seed and slash any non-system roads within the sale area concurrent with construction activities.
- Protect all ephemeral draws, springs and wet areas with marked equipment restriction zones (ERZ). If absolutely necessary, designate locations for skid trail crossings. Minimize number of crossings and space at 200 feet where feasible. This will minimize soil disturbance within the vicinity of the draws. Use designated crossings only under dry or frozen conditions.
- Comply with all stipulations set forth in the 124 permit and site-specific alternative practices granted under the SMZ Law and Rules.

- Limit harvest activities in Tendoy Gulch drainage to selection and thinning prescriptions designed to minimize potential increases of off-site water delivery. These prescriptions can be developed on a stand by stand basis with hydrologist input. Allowable harvest levels and individual stand prescriptions would depend on elevation, aspect, habitat type, cover type, existing canopy closure and proposed leaf area removal.
- No slash burning may occur in or near areas of concentrated ephemeral flow.

Wildlife

- All newly constructed roads would be closed by “slashing” (as listed above).
- All roads remaining passable would be sprayed for weeds after harvest (see weeds section below).
- All equipment would be power-washed before being brought to the project area (see weeds section below).
- If any threatened or endangered species were encountered during project planning or implementation, all project-related activities would cease and a DNRC wildlife biologist would be informed immediately. Additional habitat protection measures would be designed and implemented as appropriate.
- Prior to logging, the DNRC would confirm the current wolf status in the vicinity with the U. S. Fish and Wildlife Service, Helena.
- If active nests of an owl or other raptor were located, activities would stop until the biologist and the sale administrator could visit the site. Nest trees and all overstory trees in a 100-foot radius would be retained. Timing restrictions or nest stand protections may be implemented as well.
- Retain a 50-foot no cutting buffer on each side of springs.

Soils

- Season of use: Limit operations to periods when soils are relatively dry or frozen to 3" deep or snow covered to at least 12" deep or as needed to prevent rutting.
- The logger and sale administrator would agree to a general skidding plan prior to equipment operations. Limit tractor ground skidding to slopes less than 45%, unless using a soft track yarder (FMC). Use ground skidding with rubber tired skidders on units less than 35% slope. Designate skid trails at least 50 ft. apart. Dispersed skidding without snow protection could severely affect soils.
- Harvest units on slopes over 45% would be cable harvested to protect soil and water resources.
- For long term soil productivity, avoid displacement and minimize scarification to 30-40% of sites where required for silvicultural needs. Leave 10-15 tons large woody debris and 50% of fine litter for nutrient cycling and to maintain long-term soil productivity. This may be accomplished by in woods processing or return skidding of slash.

Roads

- Grass seed new road cutslopes, fillslopes and landings within 10 days of rough shaping with site adapted grass.

- Temporary or abandoned roads must be left in a condition that will provide adequate drainage and will not require future maintenance. Roads that are abandoned should be partially obliterated through ripping and seeding. Where it is available, slash should be scattered across the ripped road surface. Water bars should be installed at regular intervals to facilitate surface drainage.
- Complete an access road inventory to identify appropriate drainage required to comply with BMPs.
- All new roads for cable harvest units should be to be constructed to a 14-ft. width to allow for line machine access. Make road cutslopes at stable angles of 1:1 for common material, and as the slope would stand for bedrock.
- All new roads would be constructed with adequate drainage and rolls in grade. Maximum grade should not exceed 8% except for short pitches. Use Erosivity Index (EI) of 30 for general spacing of road drainage features.
- Road construction on slopes over 35% would require an excavator for pioneer road construction.
- Seed skid trails over 30%. Pile slash on skid trails where feasible.

Weeds

- Road right-of-way (R/W) user would be responsible for weed control concurrent with their use.
- All road construction and harvest equipment would be cleaned of plant parts, mud and weed seed to prevent the introduction of noxious weeds. Equipment would be inspected by the forest officer prior to moving on site.
- All newly disturbed soils on road cuts and fills would be promptly reseeded to site adapted grasses to encourage prompt regeneration, reduce weed encroachment and stabilize roads from erosion.
- Weed treatment measures may include spot herbicide treatment of noxious weeds. Where herbicide treatments are required by the forest officer, herbicide must be applied under the supervision of a licensed applicator following label directions in accordance with Department of Agriculture regulations, applicable laws and rules and regulations of the Granite County weed board.
- DNRC would monitor the sites for 2 years to evaluate weed control measures implemented and determine if any new noxious weeds establish that were not previously identified.

Table 2-1 Comparison of Alternatives

ISSUE	Alternative A No Action	Alternative B Harvest some big trees, retain unentered corridor	Alternative C Harvest no big trees, retain unentered corridor
Old Growth	Largest trees would slowly decline with understory growth and competition stress. Fuels would increase, leading to increased risk of stand loss due to hot fire. With a catastrophic fire, cumulative decreases would be immediate and large. For Flat-Pardee, Tarkzeau, West Lubrecht, Potomac, and Greenough, 239 treated acres of PP old growth still meet the working definition. Also, 105 acres old growth DF shifted to PP old growth post-treatment. No old growth was harvested in the analysis area from Forest Service lands in the recent Harvey-Eightmile Timber Sale, a short-term cumulative benefit to old growth resources. Currently, adjacent Forest Service roadless lands total approximately 6,000 acres (of which 2,600 acres are old growth). Private lands in the analysis area have almost no old growth (Figure 3-3), a net cumulative detriment to old growth resources there.	A 249-acre patch of old growth would be retained, connecting to a large roadless area. In harvested stands, net cumulative benefit to large trees retained by thinning understory. Net cumulative benefit to maintaining old growth long term, by moving some stands toward younger age classes by treatments that emulate mixed severity fire. Benefit would depend on old growth life expectancy and eventual recruitment of young stands into old growth in the future. See alt. A for change from Flat-Pardee, Tarkzeau, W. Lubrecht, Potomac, and Greenough Timber sales, and Forest Service lands (Harvey-8-mile sale). Private lands in the analysis area have almost no old growth.	A 249-acre patch of old growth would be retained, connecting to a large roadless area. In harvested stands, net cumulative benefit to large trees retained by thinning understory. Possible cumulative decreases in old growth in the future, if younger stands are not available for recruitment. But, with thinning and decreased competition stress to large trees, old growth life expectancy could increase. If so, there would be less need to create younger stands now. In that case, there would be no cumulative decrease in future old growth by not moving stands toward younger age classes now. See alt. A for change from Flat-Pardee, Tarkzeau, W. Lubrecht, Potomac, and Greenough Timber sales, and Forest Service lands (Harvey 8-mile Timber Sale). Private lands in the analysis area have almost no old growth.

Table 2-1 Comparison of Alternatives, continued

ISSUE	Alternative A No Action	Alternative B Harvest some big trees, retain unentered corridor	Alternative C Harvest no big trees, retain unentered corridor
Cover/ Corridor	Largest trees would slowly decline, but small trees could provide cover. No roads would be built, so habitat security would remain high, a cumulative benefit. No cumulative decrease likely without catastrophic event. Private lands in the analysis area have almost no overstory cover. Flat-Pardee, Tarkzeau, West Lubrecht, Potomac, and Greenough are located too far from the proposal area to contribute to overstory cover. Forest Service lands (Harvey-8-mile Timber Sale) in the analysis area were uncut and contribute to considerable overstory cover in the analysis area.	A 249-acre corridor would not be entered. Slashing would mitigate effects of road-building in the corridor. No cumulative decrease likely. In 52 acres of hotter, mixed severity burn emulation, stands would be open and provide little overstory cover. However, areas with residual cover from large trees are adjacent to most of the unentered corridor. Therefore, no cumulative negative effect to corridor habitat is likely due to the 52 acres of hotter, mixed severity burn emulation. Thinning surrounding stands should decrease the risk of a stand replacing fire. Private lands in the analysis area have almost no overstory cover, a net cumulative detriment to overstory cover. Forest Service lands (Harvey-8-mile Timber Sale) in the analysis area were uncut and contribute to considerable overstory cover in the analysis area, a net cumulative benefit to overstory cover resources.	A 249-acre corridor would not be entered. Slashing would mitigate effects of road-building in the corridor. No cumulative decrease likely. Thinning surrounding stands should decrease the risk of a stand replacing fire. Private lands in the analysis area have almost no overstory cover, a net cumulative detriment to overstory cover. Forest Service lands (Harvey-8-mile Timber Sale) in the analysis area were uncut and contribute to considerable overstory cover in the analysis area, a net cumulative benefit to overstory cover resources.

Table 2-1 Comparison of Alternatives, continued

ISSUE	Alternative A No Action	Alternative B Harvest some big trees, retain unentered corridor	Alternative C Harvest no big trees, retain unentered corridor
Snags/ CWD	Without thinning, snag numbers would increase, but recruitment of large-sized snags and CWD would eventually decrease. Therefore, there would be a short-term cumulative benefit, followed by a long-term cumulative decrease in large-sized snag habitat. No access would occur, a net cumulative benefit to snag numbers. Private lands in the analysis area have almost no snags, a net cumulative detriment to snag resources. Flat-Pardee, Tarkzeau, West Lubrecht, Potomac, and Greenough are located too far from the proposal area to contribute to snag habitat. Forest Service lands (Harvey-8-mile Timber Sale) in the analysis area were uncut and contribute snags there, a net cumulative benefit to snag resources.	Large trees retained in thinned stands would provide the raw material for large-sized future snags. There would be a cumulative benefit to recruitment of large-sized snags in the long term by moving stands toward younger age classes with mixed severity emulation now. Road-building could potentially decrease snag numbers both directly and in the future (by allowing access). This would be partly mitigated by road-slashing, which would discourage vehicle access and hence firewood cutting. No cumulative decrease likely. Private lands in the analysis area have almost no snags, a net cumulative detriment to snag resources. Forest Service lands (Harvey-8-mile Timber Sale) in the analysis area were uncut and contribute snags there, a net cumulative benefit to snag resources.	Large trees retained in thinned stands would provide the raw material for large-sized future snags. Young stands would not be created, however, resulting in a potential cumulative decrease in snag habitat over the long term. But, with thinning and decreased competition stress to large trees, old tree life expectancy could increase. If so, there would be less need to create younger stands now. In that case, there would be no cumulative decrease in future snags by not moving stands toward younger age classes now. Road-building could potentially decrease numbers both directly and in the future (by allowing access). This would be partly mitigated by road-slashing, which would discourage vehicle access and hence firewood cutting. Private lands in the analysis area have almost no snags, a net cumulative detriment to snag resources. Forest Service lands (Harvey-8-mile Timber Sale) in the analysis area were uncut and contribute snags, a net cumulative benefit to snag resources.
Weeds	Weed distribution would remain as is currently. Private lands in the area would be a constant weed source, a net cumulative detriment to weed-free resources. Weeds would likely slowly advance along edges of existing roads. The Forest Service Harvey-8-mile sale was uncut in the analysis area and provides relatively weed-free habitat, a net cumulative benefit to weed-free resources. No roads would be built, so net cumulative benefit would continue by not contributing to weed spread.	Private lands in the area would be a constant weed source, a net cumulative detriment to weed-free resources. DNRC would monitor the proposal area for 2 years and control infestations as needed and revegetate roads. Increased risk of spot infestations in forested stands. Approximately 52 acres of mixed severity fire disturbance emulation and 50 acres of clearcut would be more open than most other treated areas post-harvest. Open areas would potentially have more rapid weed spread. Potential weed-spread mitigated by power washing, using weed-free seeds, and spraying roads. Thus, no measurable cumulative effect.	Private lands in the area would be a constant weed source, a net cumulative detriment to weed-free resources. DNRC would monitor the proposal area for 2 years and control infestations as needed and revegetate roads. Increased risk of spot infestations in forested stands. Approximately 50 acres of clearcut would be more open than most other treated areas post-harvest. Open areas would potentially have more rapid weed spread. Potential weed-spread mitigated by power washing, using weed-free seeds, and spraying roads. Thus, no measurable cumulative effect.

Table 2-1 Comparison of Alternatives, continued

ISSUE	Alternative A No Action	Alternative B Harvest some big trees. retain unentered corridor	Alternative C Harvest no big trees. retain unentered corridor
Road Building	No change from current conditions. Net cumulative benefit to wildlife habit quality and security would continue by no road-building. Private lands in the analysis area are highly roaded, a net cumulative detriment to unroaded habitat. Flat-Pardee, Tarkzeau, West Lubrecht, Potomac, and Greenough are located too far from the proposal area to contribute to road density. Harvey-8-mile sale was uncut in the analysis area and is roadless, a net cumulative benefit to roadless habitat.	With mitigation (slashing,), there would be no measurable cumulative effect to habitat quality or security from road-building. Private lands in the analysis area are highly roaded, a net cumulative detriment to unroaded habitat. Harvey-8-mile sale was uncut in the analysis area and is roadless, a net cumulative benefit to roadless habitat.	With mitigation (slashing,), there would be no measurable cumulative effect to habitat quality or security from road-building. Private lands in the analysis area are highly roaded, a net cumulative detriment to unroaded habitat. Harvey-8-mile sale was uncut in the analysis area and is roadless, a net cumulative benefit to roadless habitat.
Water Quality	The primary risk to water quality is associated with (existing) road use during harvest activities. Existing substandard access roads with inadequate surface drainage and buffer zones could potentially impact water quality and downstream beneficial uses unless mitigation and remedial actions are undertaken.	Erosion control measures aimed at stabilization of existing stream crossings and other improvements to the existing road system are expected to result in long term improvements to downstream water quality and improved protection of beneficial uses. There is little risk of adverse impacts to water quality and beneficial uses occurring as a result of the proposed action alternatives.	Erosion control measures aimed at stabilization of existing stream crossings and other improvements to the existing road system are expected to result in long term improvements to downstream water quality and improved protection of beneficial uses. There is little risk of adverse impacts to water quality and beneficial uses occurring as a result of the proposed action alternatives.

Table 2-1 Comparison of Alternatives, continued

ISSUE	Alternative A No Action	Alternative B Harvest some big trees, retain unentered corridor	Alternative C Harvest no big trees, retain unentered corridor
Cumulative Watershed Effects	Past management activities in all four watersheds include the following: grazing, fire suppression, road construction, and timber harvest. Timber harvest activities have been extensive over the past 30 years, constituting approximately 2189 acres in Tyler Creek, 228 acres in Genoa Gulch, 244 acres in Tendoy Gulch and 154 acres in Grouse Gulch. Most of the harvest on Plum Creek Timber ownership, including those parcels recently acquired from Champion Timber Company, has occurred in the past eight years. Grazing activities have also been extensive, with the bulk of activities concentrating in the lower reaches of each drainage and along or near existing roads.	Estimated increases in average annual water yield due to timber harvest and road construction in Tendoy Gulch for both action alternatives are near thresholds. All other watersheds are below thresholds set by DNRC for both action alternatives. It is unlikely that the proposed levels of harvest would contribute to detectable increases in water yield or have any measurable influence on downstream channel conditions.	Estimated increases in average annual water yield due to timber harvest and road construction in Tendoy Gulch for both action alternatives are near thresholds. All other watersheds are below thresholds set by DNRC for both action alternatives. It is unlikely that the proposed levels of harvest would contribute to detectable increases in water yield or have any measurable influence on downstream channel conditions.
Cold Water Fisheries	There are no fish-bearing streams on the state section within the proposed sale area. Tyler Creek (within the analysis area) supports a cold water fishery. Fisheries surveys completed by the U.S.F.S. and the Montana Department of Fish, Wildlife and Parks (DFWP) found brown trout present and potentially pure westslope cutthroat. The westslope cutthroat population was noted as being abundant and thought to be a resident population (MDFWP 1985; Hadley 1996).	The action alternatives include improvements to mitigate problems associated with the existing road system. These improvements are expected to reduce the risk of additional impacts to fish-bearing streams during the proposed sale activities. In addition, these improvements would have a minor long-term positive influence on water quality and fisheries habitat in the watersheds draining the proposed sale area.	The action alternatives include improvements to mitigate problems associated with the existing road system. These improvements are expected to reduce the risk of additional impacts to fish-bearing streams during the proposed sale activities. In addition, these improvements would have a minor long-term positive influence on water quality and fisheries habitat in the watersheds draining the proposed sale area.

Table 2-1 Comparison of Alternatives. continued

ISSUE	Alternative A No Action	Alternative B Harvest some big trees, retain unentered corridor	Alternative C Harvest no big trees, retain unentered corridor
Soils -Long-term soil productivity -A function of compaction, displacement, rutting, and erosion	No change in existing compaction of the area, occurring on old skid trails and landings.	Harvest mitigation measures (e.g., skid trail planning and limits on season of use) would limit severe soil impacts to 15 % or less of harvest area.	Same as alternative B except 52 acres of mixed severity (fire disturbance) emulation would instead be lightly-harvested. Harvest mitigation measures (e.g., skid trail planning and limits on season of use) would limit severe soil impacts to 15 % or less of harvest area.
Soil Nutrients -tons/acre coarse woody debris	Slow increase of CWD, particularly associated with lodgepole stand mortality	Mitigation measures would retain fine litter and CWD for nutrient cycling by use of in-woods processing or return skidding of slash. This alternative would have approximately 52 acres of mixed severity fire disturbance emulation that would be more open than lightly-harvested acres post-harvest. However, potential negative effects to soil nutrients would be adequately mitigated.	Same as alternative B except 52 acres of mixed severity (fire disturbance) emulation would instead be lightly-harvested. Mitigation measures would retain fine litter and CWD for nutrient cycling by use of in-woods processing or return skidding of slash.
Soil Erosion Potential -miles of road meeting BMPs with adequate road drainage	Inadequate drainage on mixed ownership roads where BMPS are only partially met.	Drainage would be improved on all access roads to meet BMPs	Same as alternative B except 52 acres of mixed severity (fire disturbance) emulation would instead be lightly-harvested. Drainage would be improved on all access roads to meet BMPs
Economics	No return to trust, no forest improvement	2.5 million board feet harvested \$245.00 per thousand \$612,000.00 including stumpage and forest improvement payments.	2.3 million board feet harvested \$243.00 per thousand \$560,000.00 including stumpage and forest improvement payments

Chapter III

Affected Environment

Introduction

This chapter discusses the existing environment and includes effects of past and ongoing management activities within the analysis area.

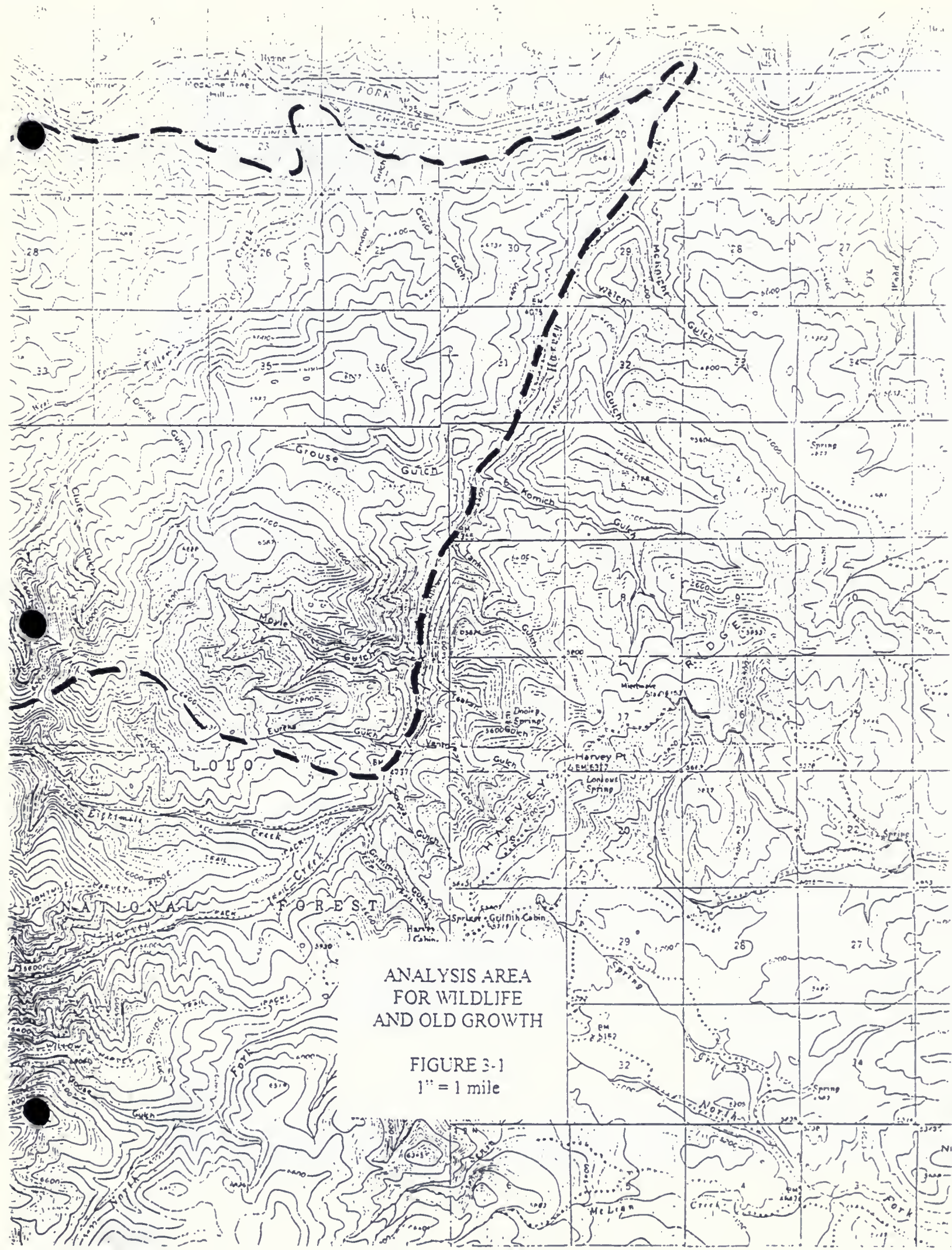
Area definitions for wildlife-related issues

The **proposal area** is Section 36, T11 N/R15W. The **cumulative effects analysis area** for the old growth, overstory cover, snags, noxious weeds and road-building issues is a combination of the Moyie-Grouse and Bateman Creek elk management units (Canfield 1991; Harvey Eightmile FEIS, Deerlodge National Forest 1991; Figure 3-1). In general, the areas to the north, east and west of Section 36 have been extensively harvested, and the area adjacent and to the south has not been roaded or logged (Figure 3-2).

Old Growth: Most of the proposal area is old growth Douglas-fir, with scattered old ponderosa pine and western larch trees. The entire section has never been harvested. Most habitat types are in the Douglas-fir series (Pfister et al. 1977). Neighboring sections to the north, east and west are in private ownership, and have been extensively logged (Figure 3-2). Harvest there has retained virtually no old growth components and would likely not be allowed to provide old growth in the near future. In contrast, the 6,000-acre Grouse Gulch-Silver King Roadless Area occurs south of the proposal area. This area includes the Moyie-Grouse elk management unit. The area contains 2,600 acres of old growth habitat (Harvey Eightmile FEIS, Deerlodge National Forest 1991; Figure 3-3). Given recent decisions not to enter the Moyie-Grouse elk management unit for harvest (Decision Notice, Harvey Eightmile FEIS, Deerlodge National Forest), it is likely that this area would remain unentered in the near future.

In the proposal area, natural successional processes have been allowed to proceed without the removal of large-sized trees or other habitat components. However, the area has experienced fire suppression in the past 50-80 years, so the understory is denser now than would be expected given historic fire regimes. The north-facing slopes located in the north half of the section are particularly dense. The south-facing slopes are more open grown, and have areas of bare ground and rock. Throughout the section, the largest oldest Douglas-fir trees (200+ years) show fire scars indicating that non-lethal burns have occurred in the past. Several wildlife species use old growth Douglas-fir habitats, including boreal owl, flammulated owl, brown creeper, Vaux swift, golden-crowned kinglet, northern goshawk, lynx, fisher, marten, and wolverine (Leach et al. 1992:92-93; Henjum et al. 1994:184). These species could be expected in the proposal area.

Table 3-1 lists the gross volume by size class in the proposal area. Most of the Douglas-fir volume (5.3 MBF) is in the 8-14.9 inch d.b.h. size class. This class represents growth acquired since the advent of fire suppression. The largest sized trees have the second greatest amount of volume (3.4 MBF).



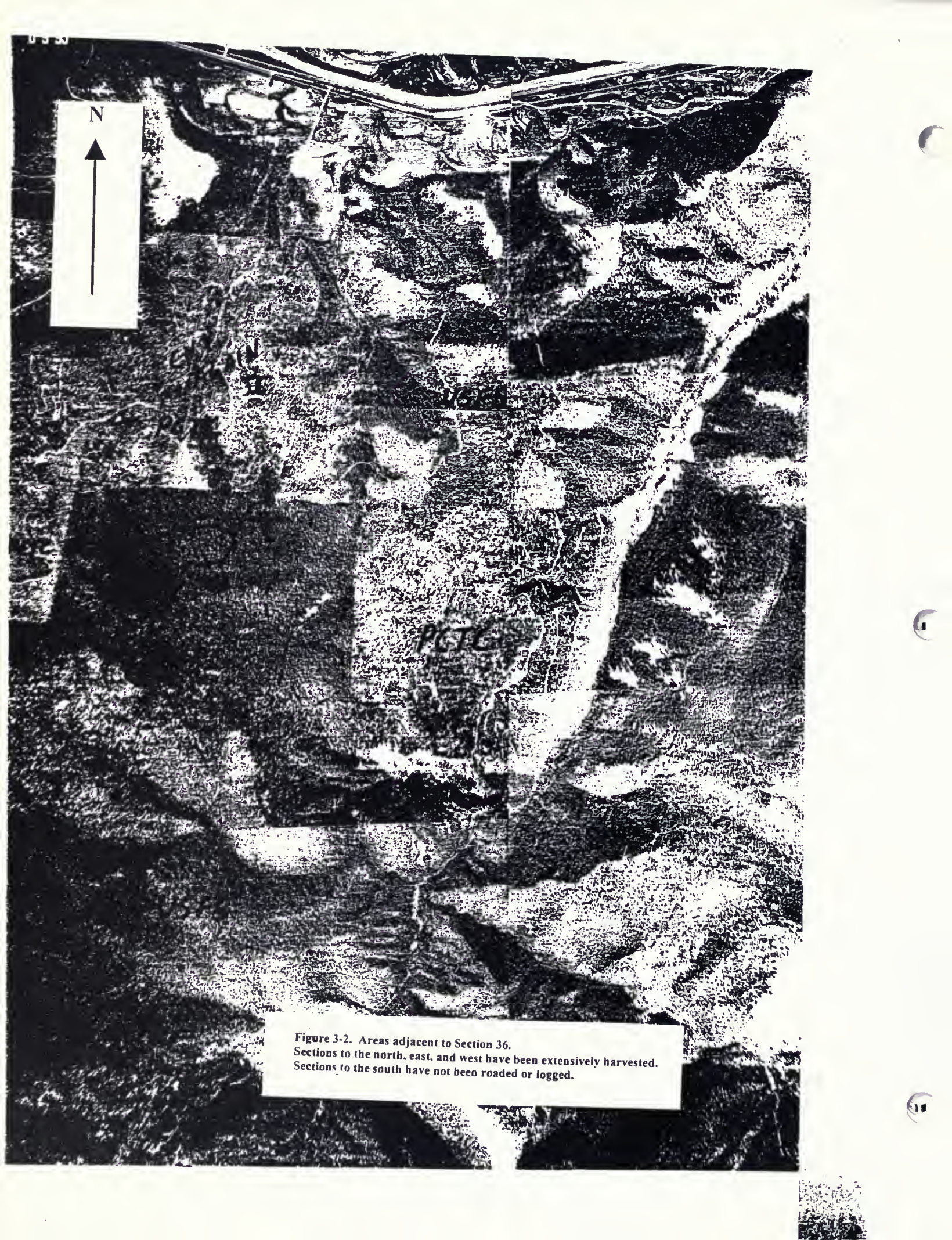
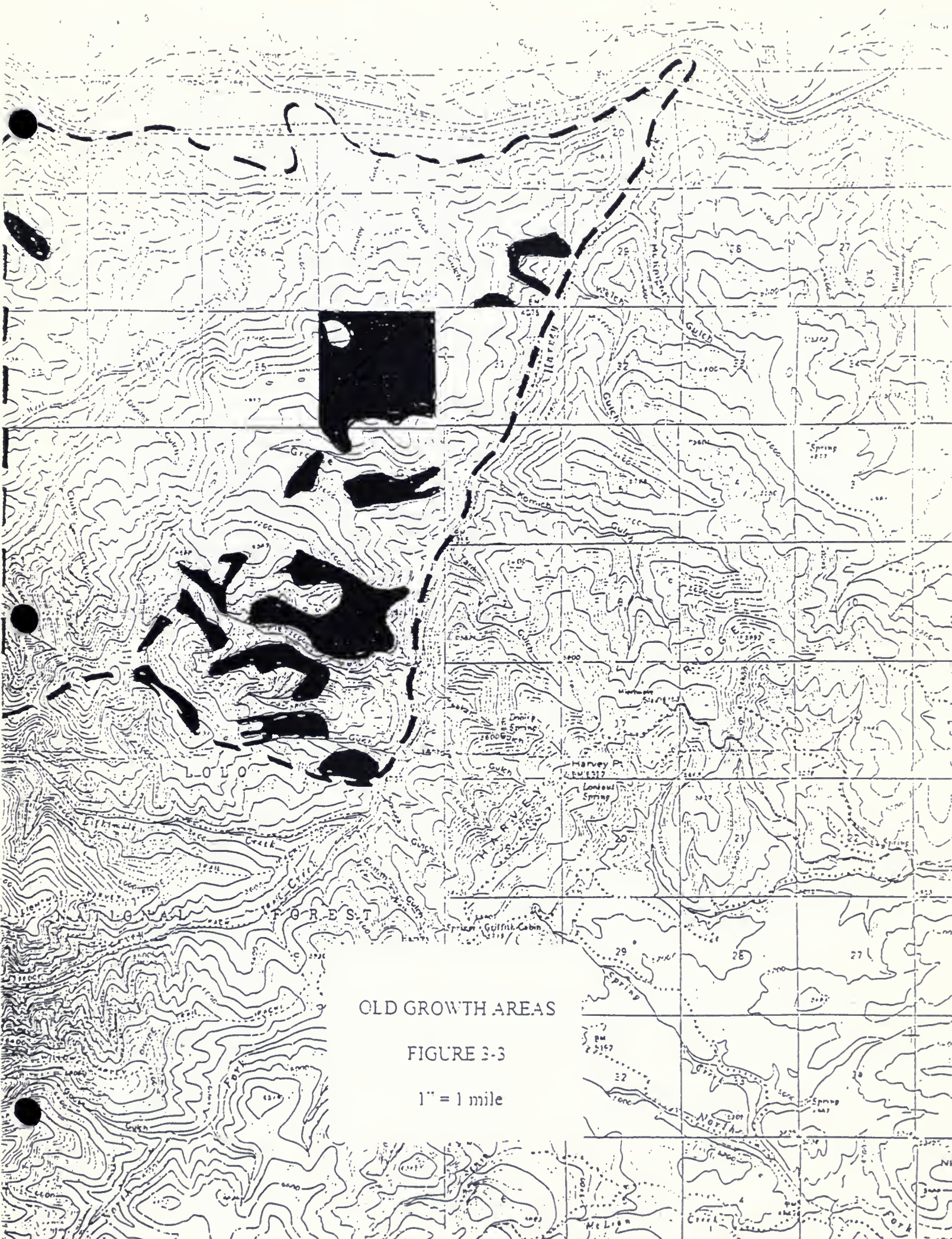


Figure 3-2. Areas adjacent to Section 36.
Sections to the north, east, and west have been extensively harvested.
Sections to the south have not been roaded or logged.



OLD GROWTH AREAS

FIGURE 3-3

1" = 1 mile

**Table 3-1. Existing Volume by Size Class
Proposed Tyler Creek Timber Sale**

	Gross Thousands of Board Feet (MBF)/Acre*				
	Ponderosa Pine	Douglas- Fir	Western Larch	Lodgepole Pine	Total
Inches d.b.h.					
8-14.9	0	5.3	0.1	2.8	8.2
15-20.9	0.1	2.7	0	0.4	3.2
21+	0.3	3.4	0	0	3.7
Total	0.4	11.4	0.1	3.2	15.1
*Based on 52 sample plots on random cruise lines in representative areas					

Assessing Old Growth: Coarse Filter and Appropriate Conditions

The SFLMP directs DNRC to “take a coarse filter approach to biodiversity by favoring an appropriate mix of stand structures and compositions on state land” (Montana DNRC Record of Decision, 1996). To implement the coarse filter, we first need to estimate how much area each cover type historically occupied on the landscape. We call these “appropriate conditions”. To determine appropriate conditions, we use our current Stand Level Inventory data. We classify stands into cover types with emphasis on shade-intolerant (that is, sun-loving) tree species present. Shade-intolerant species are emphasized because they are currently under-represented in western landscapes, due to years of fire suppression and timber harvest. Table 3-2 describes the protocol for assigning appropriate cover types from our current inventory. Once assigned, a stand is not evaluated again. This protocol is referred to as the Appropriate Conditions Filter.

**TABLE 3-2. PROTOCOL FOR ASSIGNING
APPROPRIATE CONDITIONS BY COVER TYPE**

APPROPRIATE CONDITIONS BY COVER TYPE

Appropriate Cover Type*	Stepwise Proportional Representation (%) of Species To Determine Appropriate Cover Type				
	Ponderosa Pine	Douglas- fir	Western Larch	Western White Pine	Lodgepole Pine
Western white pine (WWP)				≥10	
Ponderosa pine (PP)	≥20				
Western larch/Douglas- Fir (WL/DF)		Western larch/Douglas-fir ≥30 (western larch present)			
Douglas-fir (DF)		≥50			
Lodgepole pine (LP)					≥40
Subalpine types (ALP/NC)	Habitat type >630 and stands not yet assigned				
Mixed conifer (MC)	All remaining stands				

*Types were assigned in the order listed. Once assigned a stand was not subjected to subsequent assignment criteria. Hardwoods (HW) were not included. Current nonstocked areas for Missoula Unit (e.g., clearcuts) were tentatively classified as MC.

For example, if the recent Stand Level Inventory shows that a stand is currently composed of at least 10% white pine, then the stand would be classified as an appropriate white pine stand. If a stand is currently 8% white pine, 12% ponderosa pine and 80% Douglas-fir, then the stand would be classified as an appropriate Douglas-fir stand. Local knowledge from foresters or inventory specialists may be used to adjust the results of the Appropriate Conditions filter for particular stands.

Old-Growth Commitments from the SFLMP

The SFLMP states that DNRC would “seek to maintain or restore old growth forest in amounts at least half the average proportion that would be expected to occur with natural processes on similar sites” (MT DNRC 1996). In this document we refer to this commitment as “half of the average proportion of old growth”. DNRC defines old growth in 2 steps. The first step is the ‘conceptual definition’ presented in the SFLMP. Old growth refers to forested areas that are in the later stages of stand development. They are generally dominated by relatively large old trees, contain a wide variety of tree sizes, exhibit some degree of multi-storied structure, have signs of decadence, such as rot and spike-topped trees, and contain standing snags and large down logs.

The conceptual definition is augmented with a ‘working definition’ as follows: *stands that are 150 years and older (140 years for lodgepole pine), contain a minimum of 4 thousand board feet (4 MBF) net per acre, and exhibit a range of structural attributes associated with old age.*

DNRC developed a working definition of old growth when it became apparent that our conceptual definition did not lend itself to quantification of old growth, and hence to assurances that we were

meeting our old growth commitments. We acknowledge our working definition is 'minimal' in regard to old-growth attributes. Thus, during project planning we assess each area for old-growth characteristics to ensure something is not overlooked.

Given that our commitment for old growth is at least half of naturally occurring amounts on similar sites, and that we have a working definition of old growth in place, the next step is to determine how much old growth would have occurred naturally. Unfortunately, we have no way of knowing exactly how much old growth occurred across the landscape. Average age class proportions have been estimated using 1930's forest inventory data from across western Montana (Losensky 1997). For each cover type, we compare the current percentage of old growth, to half of the expected percentage listed in Losensky (1997), as a guide for complying with our 50% commitment.

Stands should be assessed as they come up for treatment. For example, stands that are not technically old may contain important old growth components that may be considered as a potential recruitment old stand. The "at least half" amount represents the minimum DNRC has committed to retain, but does not necessarily represent the maximum desirable for retention.

Overall, the Missoula Unit has 3,787 acres of old growth Douglas-fir cover type (Brian Long, Inventory section, DNRC, Missoula, MT; Table 3-3). These acres meet the working definition of old growth. These are scattered throughout the Unit, and occur as small-sized stands to large patches (over 200 acres). Inventory data show 11 sections in Missoula Unit have extensive stands (larger than 150 acres) mapped as old growth. Vigor classes range from healthy (full vigor) to not vigorous (poor vigor). Poor vigor stands tend to have more old growth attributes, such as increased levels of decadence, snags, downed material, and large sized trees. We assessed parameters from the 11 sections of Missoula Unit that had the most extensive stands of old growth. The assessment was general, and we ranked the following parameters as "good" vs. "not as good": patch size (large is good), road density (low is good), vigor (poor is good), and connectivity (more is good). The proposal area had a high rank when compared to other old growth Douglas-fir stands on Missoula Unit.

Missoula Unit has only 277 acres of Douglas-fir in the 0-39 yr. class (Table 3-3). Depending on the life expectancy of old growth Douglas-fir cover type, old growth recruitment may be difficult in the future with few acres in young age classes.

Table 3-3 CURRENT COVER TYPE BY AGE CLASS, MISSOULA UNIT

	YEAR CLASSES				
	0-39	40-99	100-149	150+*	
	ACRES				
COVER TYPE					TOTAL
ALP/NC	296	506	977	591	2370
DF	277	1338	2393	3787	7795
HW	0	434	171	77	682
LP	466	1895	355	5	2721
MC	181	1345	1172	471	3169
NONCOM-MERCIAL	0	0	16	0	16
NONSTOCKED	642	0	0	0	642
PP	897	11251	16143	8129	36420
WL/DF	254	1948	3629	4002	9833
WWP	142	145	0	0	287
TOTAL	3155	18862	24856	17062	63935

*Total is the cumulative effect after implementation of Flat-Pardee, Tarkzeau, West Lubrecht, Potomac, and Greenough Timber Sales, which have not all been logged yet. Approximately 239 acres in those sales were entered old growth ponderosa pine stands that meet the working definition of old growth post-harvest. Also included are 105 acres of old growth Dougals-fir that were in "ponderosa pine appropriate" stands. These acres were harvested and converted to old growth ponderosa pine

From the appropriate conditions filter (Table 3-2), we estimate the appropriate acres for each cover type, half of the average proportion (%) of old growth, and the minimum amount of old growth acres for Missoula Unit. Results are in Table 3-4.

Table 3-4. APPROPRIATE CONDITIONS and ACRES of OLD GROWTH
by COVER TYPE, MISSOULA UNIT

	APPROPRIATE CONDITIONS	½ AVERAGE PROPORTION OF OLD GROWTH	MINIMUM OLD GROWTH (a X b)	CURRENT OLD GROWTH (FROM TABLE 3-3)	DEVIATION FROM OLD GROWTH COMMIT- TMENT
	(a)	(b)	(c)	(d)	(d-c)
	ACRES	PERCENT	ACRES		
COVER TYPE					
ALP/NC	1300	10.0	130	591	461
DF	7909	2.9	229	3787	3558
HW	0	0	0.0	77	77
LP	1867	1.8	34	5	-29
MC	834	21.8	182	471	289
NONCOM	0	0	0	0	0
PP	36421	27.4	9979	8129	-1850
WL/DF	14629	16.8	2458	4002	1544
WWP	287	13.0	37	0	-37
TOTAL	63247		13049	17062	4013

Missoula Unit currently has 1850 fewer acres of old growth ponderosa pine type than necessary to meet the minimum SFLMP commitment (Table 3-4). All of the old growth Douglas-fir stands in the Tyler Creek proposal area were classed as "appropriate Douglas-fir". None were classed as "appropriate ponderosa pine" (or western larch/Douglas-fir) type that are dominated by Douglas-fir. Therefore, there would be no opportunity to convert old growth Douglas-fir cover types into old growth ponderosa pine cover types in the proposal area. In other areas of the Missoula Unit, second growth ponderosa pine stands could be grown to older age classes, or mixed stands of Douglas-fir and ponderosa pine that are classed as "appropriate ponderosa pine" could be converted to old growth ponderosa pine type.

Missoula Unit is also deficient in old growth lodgepole pine (29 acres, Table 3-4). One stand of lodgepole pine in the Tyler Creek proposal area is classed as "appropriate lodgepole pine". However, this stand (#5, 16 acres) is currently 125 to 130 years old, composed of closely-spaced 5-9 inch d.b.h. trees with small crowns, and is even-aged. The stand does not have good potential for recruitment into old growth, because the trees are small and the patch is isolated and small. Missoula Unit is planning to recruit old growth lodgepole pine from the 1993 Timber Creek Timber Sale near DeBorgia. That sale thinned 200 acres of 89-year-old lodgepole that has the potential to grow into large-sized trees. Stands in that sale are classed as "appropriate lodgepole pine". The Timber Creek area has a total 400 acres of lodgepole, a relatively large patch that would be more suitable for old growth recruitment than isolated small patches of habitat.

There is no western white pine old growth type in the proposal area. In addition, there are no western white pine appropriate stands there. Therefore, Missoula Unit would have no opportunity to address deficient old growth acres of western white pine in the proposal area.

Overstory cover and movement corridors: The proposal area is contiguous with a larger roadless area to the south. In addition, except for a small, recent cutting unit in the southwest corner of Section 30 (T11N/ R14W, at the northeast corner of the proposal area), the section is connected to the Clark Fork River corridor to the northeast (Figure 3-2). The entire proposal area is forested, in contrast to recently harvested sections adjacent on 3 sides of the area. Several species are associated with areas of overstory cover for travel, including big game, lynx, marten, fisher, and wolverine. In addition, radio telemetry data from the Fish Wildlife and Parks indicate that Section 36 is an important movement corridor for elk moving to the adjacent Grouse Gulch-Silver King Roadless area during the hunting season (Canfield 1991; Dan Hook, DFWP, pers. comm., January 1999).

Snags and coarse woody debris: Timber harvest can remove trees that appear unhealthy from a timber-producing perspective. With time and natural tree decline, however, large-sized unhealthy trees are the individuals most readily recruited into large-sized snags and ultimately, large pieces of coarse woody debris. Over 80 species of wildlife found in the Interior Columbia Basin depend on snags, coarse woody debris, and trees with decay or brooms for nesting, roosting, feeding or loafing sites (Bull et al. 1997).

The density of snags in Section 36 is not known. However, no timber harvest has occurred in the section. The proposal area averages 10 trees per acre over 20 inches dbh. Many have defects that would make suitable snag recruitment trees. In addition, the section has only 1 road segment, which was built recently (1995) and is closed by a gate at the bottom of the drainage. Low road densities contribute to retention of snags and snag recruits, because firewood cutting is minimized without vehicle access. For these reasons, we assume that the current number of snags throughout the section would be similar to the number under historical conditions. Sections to the north, east and west have been extensively harvested. Few if any large-sized snags can be seen from the road. We assume that the current number of snags in surrounding harvested areas is lower than that recommended by the DNR (MDNR 1998, Biodiversity Implementation Guidance, p. BIO 38-43) to provide wildlife habitat.

Noxious weeds: Noxious weeds can spread into disturbed soil resulting from harvest activities. Once introduced, noxious weeds can displace native vegetation. In general, noxious weeds are less palatable, less nutritious, and provide poorer cover for wildlife species than native plants. The proposal area has a relatively low road density, 1.3 miles of road per section. The recently-constructed access road is generally well vegetated with seeded grasses. Weeds are confined to the road shoulder, where there are spot occurrences of knapweed and thistle. Except for roads, there are no areas of soil disturbance that encourage weed establishment. In addition, there are few areas of open stand structure that favors weed growth, except for the southwest corner of the section. Relative to other areas in the drainage, weed infestation is light. Lower elevation access roads on other ownership in the analysis area have extensive knapweed, mainly along the roadside edges.

Road-building: Currently, the proposal area has a low road density--1.3 miles per section. Only 1 road provides access to the section. The road is closed to the general public by a locked gate, located approximately 7 road miles from Section 36. The closure is yearlong and prohibits all motor vehicles, including snowmobiles (Lolo National Forest Travel Plan Map, 1997). In addition, the proposal area is contiguous with a larger roadless area to the south. Areas with low road densities tend to provide more security and higher habitat quality compared to similar habitats with high road densities (Wisdom et al. 1999). If other factors are similar (e.g., slope, elevation, aspect, cover type, etc.), larger roadless patches have higher habitat quality than smaller roadless patches. Areas with high road densities contribute to loss of snags and snag recruits due to firewood cutting. If roads are closed to vehicles, unauthorized access can occur so that security or habitat quality is compromised.

See Appendix A for discussion of threatened, endangered, sensitive, and big game species.

Water Quality

Description of Watersheds:

The proposed timber sale area drains into the Clark Fork River near Bearmouth, approximately 28 miles east of Missoula, Montana. The sale area is located within one state section that lies along four watershed divides. These include: Tyler Creek, Genoa Gulch, Tendoy Gulch and Grouse Gulch. Adjacent landowners include USFS and Plum Creek Timber Company.

There are no stream channels draining the proposed sale area. Ephemeral draws or swales drain the majority of the proposed sale area. These draws and swales are in stable condition with no evidence of active erosion. The draws draining to the west and northwest of Section 36, T11N-R15W contain ponds and seeps/bogs near their confluence with Tyler Creek. None of these draws showed any signs of recent surface flow above the seepy, boggy areas.

The watershed analysis area addresses all four watersheds draining the sale area to facilitate hydrologic analysis and cumulative watershed effects assessment (Figure 3-4). A description of those drainages follows:

Tyler Creek:

Tyler Creek is an 8889-acre watershed that receives approximately 18-25 inches of annual precipitation. This third order tributary, is intercepted by irrigation ditches and ultimately a pond near its confluence with the Clark Fork River. It is a Class I perennial stream under the Montana Streamside Management Zone (SMZ) Law and Rules.

Genoa Gulch:

Genoa Gulch is a 973-acre watershed that receives approximately 20 inches of annual precipitation. This second order tributary to the Clark Fork River is a Class II perennial stream that flows subsurface as it reaches

FIGURE 3-4



the valley floor.

Grouse Gulch:

This 1597-acre watershed receives approximately 18-20 inches of annual precipitation. It is an intermittent, discontinuous tributary to Harvey Creek. Although primarily a Class III Stream, this drainage contains isolated segments of perennial Class II stream channel.

Tendov Gulch:

This 473-acre watershed receives approximately 20 inches of annual precipitation. It is an ephemeral, discontinuous Class III tributary to the Clark Fork River.

Regulatory Framework:

This portion of the Clark Fork River basin, including the Tyler and Harvey Creek drainages, is classified B-1 in the Montana Water Quality Standards. Waters classified B-1 are suitable for drinking, culinary and food processing purposes after conventional treatment; bathing, swimming and recreation; growth and propagation of salmonoid fishes and associated aquatic wildlife, waterfowl and furbearers; and agricultural and industrial water supply. State water quality regulations prohibit any increase in sediment above naturally occurring concentrations in waters classified B-1 (ARM 16.20.618 2(f)).

Naturally occurring means conditions or materials present from runoff or percolation over which man has no control or from developed land where all reasonable land, soil and water conservation practices have been applied. Reasonable land, soil and water conservation practices include methods, measures or practices that protect present and reasonably anticipated beneficial uses. The state of Montana has adopted Forestry BMPs through its Non-point Source Management Plan as the principal means of meeting Water Quality Standards.

Existing beneficial uses in the immediate vicinity of the proposed sale area include water rights for groundwater sources to include: stock, lawn/garden, irrigation and domestic uses. Surface water sources include: stock, irrigation and industrial uses. There are no sensitive beneficial uses in the sale area, however; downstream sensitive beneficial uses include aquatic life support and cold water fisheries.

The Clean Water Act and EPA Water Quality Planning and Management Regulations require the determination of allowable pollutant levels in 303(d)-listed streams through the development of Total Maximum Daily Load (TMDL) limits. The TMDL process is used to determine the total allowable amount of pollutants in a waterbody or watershed. Each contributing source is allocated a portion of the allowable limit. These allocations are designed to achieve water quality standards.

Grouse Gulch, which drains the proposed sale area, is a tributary to Harvey Creek. Harvey Creek (MT760004-30) is listed as a water quality limited water body (as per Section 303(d) of the Clean Water Act) in the 305(b) report. The causes of impairment are flow alteration, organic enrichment/DO, other habitat alterations and siltation with the probable sources being agriculture, dam construction, irrigated crop production, placer mining, resource extraction, rangeland and subsurface mining. According to this report, Harvey Creek is partially supporting its aquatic life support and cold water fishery beneficial uses. Grouse Gulch is an intermittent, discontinuous stream channel with no direct channel delivery to Harvey Creek.

The Montana TMDL Law (75-5-701MCA) directs the Department of Environmental Quality to assess the quality of state waters and to develop TMDL for those waters identified as threatened or impaired. Under the Montana TMDL Law, new or expanded nonpoint source activities affecting a listed water body may commence and continue provided they are conducted in accordance with all reasonable land, soil and water conservation practices. Total Maximum Daily Loads have not been completed for the Harvey Creek drainage. DNRC would comply with the Law developed by DEQ through implementation of all reasonable soil and

water conservation practices, including Best Management Practices and Resource Management Standards as directed under the SFLMP.

The Montana Streamside Management Zone Law (MCA 77-5-301) and Rules regulate timber harvest activities that occur adjacent to streams, lakes and other bodies of water. This law prohibits or restricts timber harvest and associated activities within a predetermined (SMZ) buffer on either side of the stream. The width of this buffer varies from 50-100 feet, depending on the steepness of the slope and the class of the stream.

The Montana Stream Protection Act (MCA 87-5-501) regulates activities conducted by government agencies that may affect the bed or banks of any stream in Montana. This law provides a mechanism to require implementation of BMPs in association with stream bank and channel modifications carried out by governmental entities. Agencies are required to notify the Montana Department of Fish, Wildlife and Parks (MDFWP) of any construction projects that may modify the natural existing conditions of any stream.

Existing Conditions, Water Quality

Access to the sale area comprises approximately 4 miles of Plum Creek Timber Company (PCTC) and US Forest Service cost-share road. Approximately 3 miles of PCTC road encompasses all 4 watersheds within the analysis area. Portions of these road systems meet current BMP standards, while isolated segments do not. The main access road from the locked gate in Section 23, T11N-R15W to the intersection in Section 26, T11N-R15W is gravel surfaced and insloped with inadequate surface drainage features (i.e., drive-through-drain-dips). No surface erosion or off site sediment delivery was evident at the time of inspection.

The road system in Section 25, T11N-R15W also has inadequate road surface drainage. Relief pipes in this segment are not skewed and are in need of maintenance. Some erosion of road cut and fills and ditch sloughing was also evident. Approximately 10% of the cut-slopes along this road segment are actively eroding due to oversteepened slope angles with bare, exposed soil. There were no downstream impacts to any stream channels or draw bottoms noted at the time of inspection. The remainder of these road systems (where traffic use has been minimal) has a vegetated running surface, which is currently providing adequate protection against surface erosion. In addition, there are several existing stream crossings that are lacking protection of the inlets and outlets. These stream crossings have been trampled from excessive cattle use.

The existing roads and stream crossings may continue to be a potential source of impacts to downstream water quality, unless mitigation and remedial action measures are undertaken.

Existing Conditions from Cumulative Watershed Effects of Past Activities,

Past management activities in all four watersheds include the following: grazing, fire suppression, road construction, and timber harvest. Timber harvest activities have been extensive over the past 30 years, constituting approximately 2189 acres in Tyler Creek, 228 acres in Genoa Gulch, 244 acres in Tendoy Gulch and 154 acres in Grouse Gulch. Most of the harvest on Plum Creek Timber ownership, including those parcels recently acquired from Champion Timber Company, has occurred in the past eight years. Grazing activities have also been extensive, with the bulk of activities concentrating in the lower reaches of each drainage and along or near existing roads.

All drainage features in the proposed sale watershed analysis area were inventoried and evaluated by a DNRC hydrologist. Stream channel evaluations (Pfankuch, 1975) were used to assess stream stability and impacts of development and past management activities in Tyler Creek, because it is the only known fish-bearing stream within the analysis area. Channel conditions on the mainstem of Tyler Creek ranged from "fair" to "good" condition. The assessment conclusions were similar to evaluations performed by the USFS in 1978. Channel conditions in Tendoy Gulch were noted as being relatively stable. Impacts are limited to trampling, bank shearing and soil erosion from cattle trails. Genoa Gulch also has impacts resulting from excessive cattle use. These impacts are greatest at a spring development-stock watering tank in Section 31, T11N-R14W. Portions

of Grouse Gulch showed evidence of past peak flow events resulting in channel adjustments. Downcutting with 4-5 foot headcuts and lateral bank erosion were found in Sections 1 & 2, T10N-R15W. It appears that these secluded reaches were the result of natural catastrophic peak flows that did not result in increased water yields from timber harvest. The reaches containing these impacts are not located directly downstream of any past timber harvest. Just above Section 6, T10N-R14W the channel flows subsurface and becomes more incised with a vegetated bottom. There was no evidence of any recent surface flow from this point to the confluence with Harvey Creek.

A cumulative watershed effects analysis for all 4 watersheds draining the state section was completed by DNRC to determine the existing conditions of the proposed sale area using the Equivalent Clearcut Area (ECA) methodology outlined in Forest Hydrology Part II (USDA For. Serv. 1974). ECA is the total area within a particular subdrainage that does or would exist in a clearcut condition. An ECA value is determined by adding the area in a clearcut condition with an "equivalent" clearcut area for roads outside of clearcut units and for partial or selective cut units (Region 1- USFS, 1974). Recovery values were verified and adjusted by observations made in the field. This methodology was also used to estimate existing Water Yield Increases (WYI) in each watershed. WYI is calculated as a function of area (acres) treated, percent forest crown removal, precipitation patterns, and estimates of the amount of hydrologic recovery due to vegetative regrowth. Harvest history and road information compiled for this analysis was obtained from Plum Creek Timber Company, USFS Lolo NF TSMRS database, and USFS aerial photos. The results of this analysis are summarized below in Table 3-5:

**TABLE 3-5. Existing Watershed Conditions (Resulting From Past Activities)
Proposed Tyler Creek Timber Sale Area**

Watershed	Drainage Pattern	Total Acres	Existing Road Miles	Cumulative ECA	Area in ECA	Water Yield Increase*
Tyler Creek	Perennial	8889	54.8	1099	12%	5.1%
Genoa Gulch	Discontinuous	973	6.3	151	16%	7.0%
Grouse Gulch	Discontinuous	1597	2.5	85	5%	1.9%
Tendoy Gulch	Discontinuous	473	3.2	153	32%	13.8%

*Water Yield Increase (WYI) is an estimate of percent water yield over expected natural levels due to management activities.

Past management activities within the analysis area have resulted in impacts to water quality. Conclusions from field evaluations show that these impacts are limited to sediment delivery and erosion from roads and are restricted to stream crossings and isolated segments of existing roads. Estimated increase in average annual water yield due to timber harvest and road construction in Tendoy Gulch is currently 1.2% below the threshold set by DNRC. A threshold of 15 % WYI was established using a matrix guide developed for the SFLMP Watershed RMS # 7, which uses an acceptable risk level, watershed sensitivity and resource value as its parameters.

Cold Water Fisheries Data

There are no fish-bearing streams on the state section within the proposed sale area. Tyler Creek (within the analysis area) supports a cold water fishery. Fisheries surveys completed by the USFS and the Montana Department of Fish, Wildlife and Parks (DFWP) found brown trout present and potentially pure westslope cutthroat. The westslope cutthroat population was noted as being abundant and thought to be a resident population (MDFWP 1985; Hadley 1996).

Habitat assessments completed by the USFS, Lolo N.F. summarized overall habitat conditions in Tyler Creek upstream of the proposed sale area as fair, with the majority of past impacts resulting from grazing activities. Past grazing and timber harvest management have resulted in increased sediment and a decrease in the riparian shrub component and recruitable trees for in-channel large woody debris. It was noted, however, that riparian habitat condition is in an upward trend. Two known fish barriers exist along the mainstem of Tyler Creek. One (an under-sized culvert) is near the confluence with the West Fork Tyler Creek, the other (an irrigation pond and a culvert set above streambed grade) is at the confluence with the Clark Fork River.

Existing Conditions, Geology

The proposed sale area is located on terrain of moderate to steep mountain sideslopes with some abrupt slope breaks and deeply incised draws that reflect the structural bedrock control of the landscapes. Bedrock is mainly Missoula group quartzite (32Q, 64Q) on the northerly 2/3 of the section, with a lessor area of limestone bedrock in the southeast 1/3 of the section. Both of these bedrock types are resilient and stable. No especially unique or unstable terrain was noted in the project area. Bedrock is exposed along the ridgeline and upper mountain sideslopes. Most material should be common excavation for road construction, with the exception of the bedrock outcrops and very shallow soil areas that would require ripping for road construction.

Existing Conditions, Soils

Soil types are closely related to the bedrock type (Table 3-6). Vegetation type and surface soil depth vary by aspect with volcanic ash surface soils and moister sites more common on north aspects. Vegetation types are somewhat drier phases than the typical attached map unit descriptions because this is on the eastern boundary of the described range.

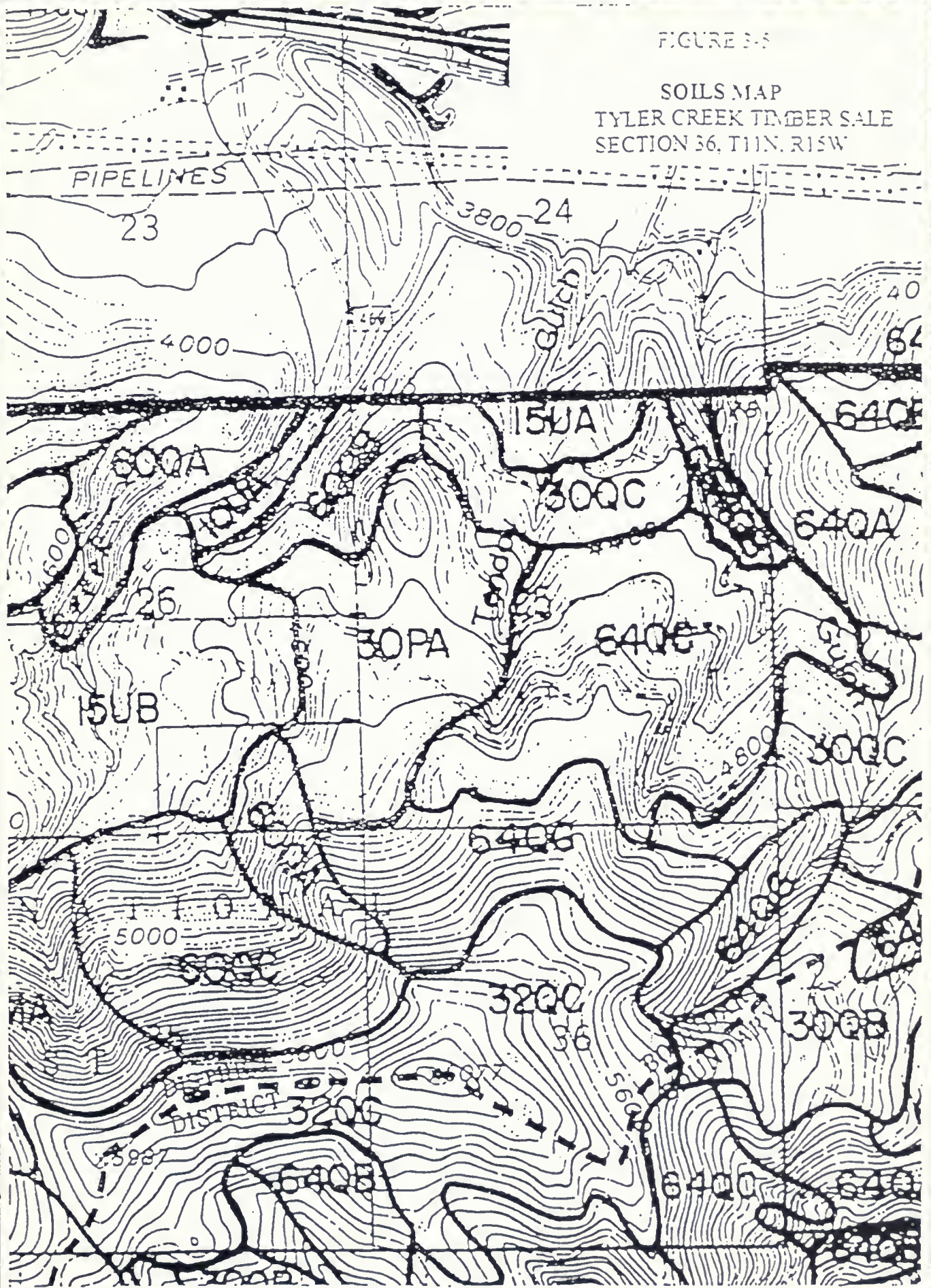
Table 3-6. Soils Summary, Proposed Tyler Creek Timber Sale Area.

Map Unit	Soil Description	Slope % Aspect	Erosion Potential	Displacement Potential	Notes
30 QB	Mountain sideslopes, Deep very gravelly sandy loams from quartzite	30-55% S,E,W	Moderate	Slight to Moderate	Droughty site, well suited to PIPO, PSME
32 QC	Ridgetops Moderately deep very gravelly sandy loams from quartzite	10-35%	Moderate	Moderate to high , shallow topsoils	Cool, somewhat dry, PIPO, PSME, N aspects support PICO, LAOC
64 QB/C	Steep Mountain Sideslopes Moderately deep extremely gravelly loams	55-75% S & W	Mod Low on roads	High, shallow topsoils	Droughty site, well suited to PIPO, PSME
64 QG	Steep Mountain Sideslopes, Moderately deep extremely gravelly loams	55-75% Variable	Moderate Low on roads	High, shallow topsoils	Cool somewhat dry, North aspects support PICO, LAOC

Map unit 32Q C includes well-drained, moderate to deep soils on broad convex ridges of 15-35% slope (Figure 3-5). Southerly aspects are more droughty sites with shallower surface soils. Northerly aspects and draws have moister vegetation, supporting PSME/PHMA, PSME/LIBO and beargrass phase habitat

FIGURE 3-5

SOILS MAP
TYLER CREEK TIMBER SALE
SECTION 36, T11N, R15W



types (Pfister et al. 1977) on deeper surface soils of 6-8" silt loams and gravelly loams. Volcanic ash surface soils are intermittent and where they occur in concave locations (swales or draws) the site productivity is greater. Included soils in this map unit are very gravelly silt loams weathered from limestone in the southeast ¼ of the section. Interpretations are similar, but carbonates can occur at 25"-40" depth and may limit rooting and promote more Douglas-fir types.

Soil map unit 30QB includes somewhat excessively drained, moderate to deep gravelly on mountain sideslopes of 35%-55%. Topsoils are gravelly silt loams about 5" thick over very gravelly sandy loams weathering from quartzite and argillites. South and west aspects have shallower surface soils and are dry sites supporting Ponderosa Pine, on PSME/SYAL and PSME/PHMA habitats (Pfister et al. 1977). These soils have a long season of use, and tend to be droughty with somewhat greater vegetative competition.

Parts of the 30 and 32 units with slopes less than 45% are well suited to tractor operations, but materials are susceptible to displacement, due to shallow soils. Material quality is excellent for roads on both soils. Erosion hazard of disturbed soils is moderate on both types and can be controlled with standard drainage practices. Rock outcrops occur on 5-15% of the unit along ridgelines, where ripping may be required for road construction.

Soil map unit 64Q C/D includes shallow to moderate depth very gravelly silt loam soils weathering from quartzite and argillite on steep sideslopes of 50-75%. Fractured bedrock can occur at shallow depth, but is rippable. Soils have a long season of use, low compaction hazard, high displacement hazard. Soils are well drained and tend to be droughty especially on the southerly aspects. Dominant habitats are Douglas fir/snowberry (Pfister et al. 1977) on southerly slopes, with higher productivity Douglas fir/ninebark and Grand-fir/twinflower (Pfister et al. 1977) on north-facing slopes and swales.

The steep slopes on the 64 units require cable yarding to avoid displacement and severe impacts. Erosivity of disturbed soil is moderate to low for roads and can be controlled with standard drainage practices. Both soils are good road material. Cutslopes on south aspects can be slow to revegetate and require prompt reseeding to establish grass cover.

Most of the access road to Section 36 is in fair to good condition requiring maintenance and some additional drainage features at certain location. The access road through Section 26 crosses deep alluvial soils and some segments of fine textured soils with lower rock contents. These low bearing strength soils tend to remain moist later in the year than other sites within the sale area and limit haul operations to dry or frozen conditions.

There is no previous harvest or effects to soils in this section with the exception of the main access road through the section and the potential for cumulative effects is low.

Surface erosion occurs on portions of access roads prior to the state Section 36. Recent road construction with Section 36 is stable and well drained. Most of road system crosses well-drained residual soils with high rock contents. Surface erosion can be effectively controlled by installing drainage features on roads and skid trails, followed by prompt revegetation of disturbed soils with site adapted grasses. Potential soil impacts would be avoided or reduced to acceptable levels by implementation of BMPs and the following recommendations.

Current Conditions from Past Cumulative Effects to Soils

No previous timber harvest has been conducted in this section, except for construction of the existing access road. Cumulative effects to soil productivity within the State section are of minimal concern. Future stand entries would likely use existing roads, trails and landings and therefore present low risk of cumulative effects.

CHAPTER IV

Environmental Consequences

Introduction

This chapter describes the environmental consequences or effects of the proposed action and the cumulative effects of past, concurrent and future state activities within the analysis area.

Alternative A, no action

Old Growth: Without harvest, there would be no direct change to old growth habitat from current conditions. With time and no disturbance, the understory would continue to increase. Eventually, large overstory trees would experience increased competition stress from understory trees. As a result, some large trees would be expected to die sooner than with thinning. This would increase the decadent component of old growth. However, if medium-sized trees experience competition as well, they may not grow into replacement large-sized trees as quickly as they would have with thinning. Natural processes that could accomplish thinning, such as cool, underburning fires or insect and disease outbreak, may not be allowed to occur. If fires do occur, they could burn more intensively and over larger areas than historically, due to increased fuels. The old growth may be burned in a stand replacement fire, or the fire may be successfully suppressed. Except for fire occurrence, most of these possible cumulative changes would occur slowly over long periods of time. Therefore, there may be a cumulative decrease in old growth, depending on time passage, competition stress, and risk of stand replacement burn. If none of these disturbances occur, then there would be a gradual increase in decadence--an increase in an old growth component.

Cumulative Effects

Without the proposed harvest, there would be a gradual increase in small to medium-sized Douglas-fir, and a gradual decrease in large-sized Douglas-fir in the proposal area. Fuels would continue to increase. There would be a cumulative decrease in old growth if a stand-replacing event occurred. Unit-wide, recent past harvest at Flat-Pardee, Tarkzeau, West Lubrecht, Potomac, and Greenough Timber Sales has altered 239 acres of ponderosa pine old growth. In addition, 105 acres of old growth Douglas-fir were converted to old growth ponderosa pine by harvest in those sales. That is, the treated stands were mapped as "ponderosa pine appropriate stands". Removal of Douglas-fir and retention of large ponderosa pine changed the stand classification to ponderosa pine cover type while still meeting the working definition of old growth post-harvest.

In the analysis area, the Harvey-Eightmile Timber Sale, Deerlodge National Forest, did not remove old growth from the Moyie-Grouse or Bateman Creek elk management units. Old growth harvest there was south, in the Eightmile Creek elk management unit (USDA For Serv. 1991: p.2-17; Canfield 1991). Private lands in the analysis area provide almost no old growth.

Overstory cover and movement corridors: Without harvest, there would be no direct change to overstory cover or movement corridors. As with old growth, the largest trees may decline due to competition stress. Because no new roads would be built, security would remain high. Therefore, smaller trees could probably provide adequate movement corridors, even if larger trees were lost. The area would remain connected to the maximum extent possible to the roadless area to the south, a net cumulative benefit. Without thinning, there would be a risk of catastrophic events such as stand-replacing fire or insect infestation, which would be a negative effect to overstory cover.

Cumulative Effects

Unit-wide, Flat-Pardee, Tarkzeau, West Lubrecht, Potomac, and Greenough are located too far from the proposal area to contribute to overstory cover. In the analysis area, private lands have almost no

overstory cover. Forest Service lands in the analysis area (adjacent and south of the proposal area) continue to provide overstory cover, because none were entered in the recent (1991) Harvey-Eightmile Timber Sale.

Snags and coarse woody debris: There would be no direct change to snags or CWD without harvest. Because no roads would be built, snags would not be available for unauthorized felling from woodcutting. Snag security would remain high, a net cumulative benefit to snag numbers. Without harvest or other thinning mechanisms, trees would continue to die and become snags. However, medium-sized trees may take longer to attain large size. Eventually, large-sized trees (and therefore large snags) may decrease if recruitment slows. This could lead to a decrease in large-sized coarse woody debris as well. There would be some risk of stand replacement fires due to increased fuels. If a stand-replacing fire occurred, snag numbers would initially increase, but recruitment would only occur as seedlings or remnant trees grew and eventually died. However, we assume that fire suppression efforts would occur, somewhat decreasing the likelihood of a stand-replacing event. Thus, with no action there would be a cumulative benefit to snag habitat by the continued death of large-trees, but eventually a cumulative decrease in large-sized snags and coarse woody debris and increased threat of catastrophic events.

Cumulative Effects

Unit-wide, Flat-Pardee, Tarkzeau, West Lubrecht, Potomac, and Greenough are located too far from the proposal area to contribute to snag habitat. Private lands in the analysis area have almost no snags. Forest Service lands in the analysis area contribute snags in uncut areas of the Harvey-Eightmile Timber Sale that are adjacent and south of the proposal area.

Noxious weeds: Private lands in the area would continue to be a constant weed source. Without harvest, noxious weeds would continue to spread upslope along access roads. While knapweed could establish on the northerly aspects, it would likely be only isolated plants due to the competitive native vegetation. Weeds would not be expected to increase, because no soil would be disturbed. No new roads would be built, so weeds would not be dispersed into currently unroaded areas.

Cumulative Effects

Unit-wide, Flat-Pardee, Tarkzeau, West Lubrecht, Potomac, and Greenough are located too far from the proposal area to contribute to weeds. Without harvest, weeds would not be expected to increase in the proposal area--a net cumulative benefit. In the analysis area, Forest Service lands included in the Harvey-Eightmile Timber Sale provide relatively weed-free habitat in uncut areas adjacent and south of the proposal area. Private lands would continue to provide weed seed in the analysis area.

Road-building: Without harvest, no roads would be built. There would be no direct change to wildlife habitats or species due to road-building.

Cumulative Effects

Unit-wide, Flat-Pardee, Tarkzeau, West Lubrecht, Potomac, and Greenough are located too far from the proposal area to contribute to road density. There would be a net cumulative benefit to habitat security and quality by not building roads in the proposal area. In the analysis area, private lands would continue to be highly roaded. Forest Service lands in the Harvey-Eightmile Timber Sale provide roadless habitat in uncut areas adjacent and south of the proposal area

Alternative B. Harvest some large trees, retain unentered corridor

Old Growth:

This alternative would retain unentered 249 acres of old growth that occur in a large contiguous patch.

Effects in unentered stands would be similar to the no action alternative. Old growth components would remain intact except for change due to natural processes. Thinning surrounding stands should decrease the risk of a stand replacing fire. Large trees may experience competition stress in the unentered area, however.

Approximately 255 acres would include entered old growth stands where all large trees (i.e., those greater than 20 inches d.b.h.) would be retained at this time except for those removed incidentally to road construction or cable corridor placement. None would be targeted for removal, however. Basal area would average 80 square feet per acre post-harvest. In these areas, most old growth components such as large-sized green trees, snags, and decadence would be only slightly lower post-harvest. Coarse woody debris may decrease because heavy equipment might break up pieces on the ground. However, logging slash returned to the units would partly mitigate for this effect. Large cull pieces would be retained on the site. All snags would be retained unless they were dangerous to humans during harvest operations. Overall, thinning small to medium-sized trees would decrease competition stress to the remaining large trees. In addition, 14-16 inch d.b.h. trees that are retained would have a better chance to grow into larger size classes and therefore into larger snag recruits. Harvest of ladder fuels should decrease the risk of a stand-replacing fire.

Approximately 80 acres of old growth included in the above 255 acres would be logged with a cable system. Overall, these stands would meet the working definition of old growth post-harvest. However, structurally the stands would have 10-foot wide clearings spaced every 100 feet, for the cable corridor access. Therefore, approximately 10% of the area in the cable system would appear open after harvest. Neighboring trees would contribute canopy cover on the edges of the corridor.

Approximately 52 acres of old growth would be treated as a mixed severity burn, where some large trees would be removed. Structures would be open post-harvest and basal area would average 40 square feet per acre. Depending on the age of remaining trees, stands may be moved into a younger age class. Some relic old trees would be retained in each stand—the target would be 4 old relics per acre. These would include cull trees that would not count toward future available harvest. Therefore, the proposed harvest would reduce overall old growth attributes in these stands, but not eliminate them.

Stands proposed for mixed-severity emulation were chosen for the following reasons:

- 1) they would likely respond to thinning by increased growth;
- 2) they were located farthest from the U.S.F.S. roadless area (south of Section 36); and
- 3) they were located adjacent to recently-harvested stands on adjacent private ownership. This reduces fragmentation, because it concentrates areas where open stands would occur.

For example, private lands in Section 35 (west of Section 36) have been harvested so the ownership line between sections appears as a visible straight line from the air or distant roads. Harvest in the proposed treatments that emulate mixed severity fire disturbance regimes in Section 36 would “feather the edges” between ownership lines, so that harsh lines would be softened. Placing stands proposed for mixed severity emulation farthest from the roadless area allows unentered or lightly-harvested stands to be located near the roadless area. This maintains habitat integrity adjacent to the large patch of roadless old growth.

One goal of harvest that leaves less basal area is to open stand structures and move stands toward younger age classes. Thus, the likelihood of retaining old growth through a longer time period may be greater than if fewer stands were in younger age classes. Although surrounding stands on 3 sides of Section 36 are quite young and open, past harvest did not retain many (or perhaps any) large old trees. Therefore, these stands would not likely be recruited into old growth as soon as stands that are harvested with retention of relic large trees. Considering that surrounding lands are in private ownership, it is

likely that the stands would not be recruited into old growth in the near term.

In summary for Alternative B, some thinned stands would retain all large trees. In those areas there would be a slight direct negative effect to old growth if large trees are incidentally removed or where coarse woody debris is broken up by harvest activities. Negative effects would be mitigated by reduced competition stress to large trees resulting from understory thinning, return skidding of slash, by leaving large cull pieces on site, and by not entering 249 old growth acres that occur in a large contiguous patch. There would be a net cumulative benefit to old growth by understory thinning resulting in reduced competition stress and lowered risk of stand-replacing fire.

In stands treated to emulate mixed severity fire disturbance, there would be a fairly large direct negative effect to old growth components because harvest would remove large trees. However, large trees would not be eliminated from these stands. Direct effects would be mitigated in stands treated to emulated mixed severity fire disturbance by the following:

- Retain a target of 4 large trees per acre post-harvest;
- Cut a relatively small area to emulate mixed severity fire disturbance—only 52 acres of 307 treated old growth acres (or, only 52 acres of a total of 556 old growth acres in the section);
- Locate the stands proposed for mixed severity (fire disturbance) emulation distant from the large patch of roadless habitat south of the section;
- Locate the stands proposed for mixed severity (fire disturbance) emulation adjacent to recently-harvested, open stands;
- Return skid slash; and
- Reduce competition stress to large trees by understory thinning.

Direct effects in stands proposed for mixed severity (fire disturbance) emulation would be further mitigated by these actions:

- No entry into 249 old growth acres that occur in a large contiguous patch in Section 36; and
- Retain all large trees (except those removed incidentally to road construction and cable placement) in 255 acres of harvested old growth stands (“lightly-harvested stands”).

Gross volumes of harvest and leave trees, by size class and alternative, are listed in Tables 4-1 and 4-2. Most of the volume to be removed in both action alternatives would be in the 8-14.9 inch d.b.h. group (Table 4-1). These lodgepole pine and Douglas-fir stems are the trees that likely would have been removed by periodic low intensity fire. All of the lightly-harvested stands would meet the working definition of old growth post-harvest. Table 4-3 lists acres of treated and untreated old growth by cover type. Most the volume retained—nearly 3 MBF in either action alternative—would be in the largest size-class (Table 4-2). However, old growth attributes (amount of decadence, downed woody material, snags, large trees, etc.) would be lower post-harvest than without disturbance. Although many acres would be treated, there would still be 249 unentered old growth acres in the proposal area post-harvest.

**Table 4-1. Proposed harvest by alternative, species and size class
Proposed Tyler Creek Timber Sale**

	Gross Thousands of Board Feet (MBF)/Acre*						
	Ponderosa Pine	Douglas- Fir		Western Larch	Lodgepole Pine	Total Harvest	
Inches d.b.h.		Alt B	Alt C		Same for Both Alts.	Alt B	Alt C
8-14.9	0	3.4	3.2	0	2.4	5.8	5.6
15-20.9	0	0.4	0.4	0	0.3	0.7	0.7
21+	0	0.5	0.2	0	0	0.5	0.2
Total	0	4.3	3.8	0	2.7	7.0	6.5
*Based on 52 sample plots on random cruise lines							

**Table 4-2. Proposed leave trees by alternative, species and size class
Proposed Tyler Creek Timber Sale**

	Gross Thousands of Board Feet (MBF)/Acre*						
	Ponderosa Pine	Douglas- Fir		Western Larch	Lodgepole Pine	Total Leave	
Inches d.b.h.		Alt B	Alt C		Same for Both Alts.	Alt B	Alt C
8-14.9	0	1.9	2.1	0.1	0.4	2.4	2.6
15-20.9	0.1	2.3	2.3	0	0.1	2.5	2.5
21+	0.3	2.9	3.2	0	0	3.2	3.5
Total	0.4	7.1	7.6	0.1	0.5	8.1	8.6
*Based on 52 sample plots on random cruise lines							

Table 4-3. Effects of proposed Tyler Creek Timber Sale on Old Growth in the Proposal Area (S36/T11N/R15W), by Cover Type

COVER TYPE	EXISTING OLD GROWTH PROPOSED FOR TREATMENT	ACRES						
		ENTERED AND MEETS WORKING DEFINITION OF OLD GROWTH POST-TREATMENT		NON-ENTERED OLD GROWTH			NON-ENTERED AND ENTERED ACRES THAT MEET THE WORKING DEFINITION OF OLD GROWTH POST-HARVEST	
		ALT B	ALT C	ALT A	ALT B	ALT C	ALT B	ALT C
ALP/NC	0	0	0	0	0	0	0	0
DF	183	131	183	414	231	231	362	414
HW	0	0	0	0	0	0	0	0
LP	0	0	0	0	0	0	0	0
MC	0	0	0	0	0	0	0	0
PP	76	76	76	94	18	18	94	94
WL/DF	48	48	48	48	0	0	48	48
WWP	0	0	0	0	0	0	0	0
TOTAL	307	255	307	556	249	249	504	556

Cumulative Effects

In the proposal area, there may be a net cumulative benefit to long term recruitment of old growth, by moving 52 acres into younger age classes that retain relic old trees. The degree of the benefit would depend on the life expectancy of old growth habitat. If old growth is expected to decline in the near future, then creating young stands for future recruitment would have a higher benefit than if old growth were not expected to decline.

Unit-wide, recent past harvest of Flat-Pardee, Tarkzeau, West Lubrecht, Potomac, and Greenough Timber Sales has altered 239 acres of ponderosa pine old growth. In addition, 105 acres of old growth Douglas-fir were converted to old growth ponderosa pine by harvesting Douglas-fir from "ponderosa pine appropriate stands". All treated old growth acres meet the working definition for old growth post-harvest.

In the analysis area, The Harvey-Eightmile Timber Sale, Deerlodge National Forest, did not remove old growth from the Moyie-Grouse or Bateman Creek elk management unit (USDA For Serv. 1991: p.2-17, Canfield 1991). Cumulative effects would be similar to the no action alternative. Industrial private lands in the analysis area provide almost no old growth habitat (Figure 3-3), and likely would not provide old growth habitat in the near future. This is a negative cumulative effect to old growth habitat.

Overstory cover and movement corridors:

Alternative B would retain unentered a corridor of old growth habitat from the northeast corner of Section 36, south to the roadless area in Grouse Gulch. Habitats in other ownership adjacent to the northeast corner are somewhat fragmented, but are the most likely areas to allow movement to the Clark Fork River. The proposed corridor in Section 36 includes ridgetops that could provide movement areas

for species such as big game, lynx, wolverine, or marten.

Selected stands adjacent to the corridor would be harvested using treatments intended to emulate a mixed severity fire disturbance in Alternative B. Although more open than other treated stands post-harvest, their presence would likely not change the utility of the unharvested corridor. Thinning adjacent to the unharvested corridor area may decrease competition stress for trees at the periphery of unentered stands.

Thinning would also decrease the risk of occurrence of a stand-replacing fire. Therefore, thinning could contribute to a net cumulative benefit for the long-term maintenance of the corridor. Alternative B would require roads to be built that would cross the corridor. Any new roads would be "slashed" after harvest activities are complete. That is, slash would be placed on the road surface for its entire length. This would make travel on the road by foot, bicycle, horseback or vehicle difficult to impossible. Therefore, habitat security should be similar post-harvest in the corridor area. Coarse woody slash on unnaturally flat road surfaces provides structural diversity and cover for small mammals, birds, amphibians, and reptiles as well. In addition, Alternative B retains a light-harvest buffer between the clearcut lodgepole stands and the corridor, to maintain habitat integrity adjacent to the corridor.

In summary, timber harvest would result in negative direct effects to overstory cover and movement corridors. However, negative effects would be mitigated by not entering a corridor from the northeast corner of the section to the roadless area south of the section.

Cumulative Effects

Unit-wide, recent sales are located several miles away, so that overstory cover there would not affect the proposal area. In the analysis area, the Harvey-Eightmile sale did not affect overstory cover or movement corridors. Cumulative effects would be similar to the no action alternative. Industrial private lands in the analysis area provide almost no overstory cover (Figure 3-2), and likely would not provide overstory cover in the near future. This is a negative cumulative effect to overstory cover habitat.

Snags and coarse woody debris:

Alternative B would retain snags and coarse woody debris in 249 unentered old growth acres in the corridor. In 386 acres of stands proposed for harvest, there would be direct negative effects to snags and coarse woody debris if snags are removed for safety reasons or debris is disturbed during harvest. Effects should be minor, because usually few snags are considered hazardous. In lightly-harvested stands (255 acres), large trees would benefit from decreased competition stress. They would continue to grow and eventually would provide the raw materials necessary for large-sized snags and coarse woody debris. Without thinning, the large trees would continue to compete with understory trees, and may become snags sooner than with thinning. However, without thinning, fewer medium-sized trees would be expected to grow into large sized trees, so that the supply of large snags and coarse woody debris could decrease with time.

Trees with obvious defect (usually sweep, some rot) in the butt section would be "high stumped" and left standing, rather than low stumped and "long-butted". DBH would vary. In 255 acres of lightly-harvested habitat, however, large trees would be retained regardless of defect. With time, these would provide the raw materials necessary for snags. This would help mitigate for potential snag removal, and eventually would provide coarse woody debris.

In stands proposed for mixed severity fire disturbance emulation (52 acres), some large trees would be removed. Future numbers of large snags may decrease because fewer large trees would be present post-harvest. However, this would be mitigated somewhat by retaining a target of 4 large trees per acre, many of which are now culls. These trees would provide the raw materials necessary for snags in the relatively near future. Trees remaining from thinning would continue to grow and eventually would provide the raw materials necessary for large snag replacements. In addition, only 52 acres of 307 treated old growth

acres (or 52 of 556 total old growth acres in the section) would be treated this way. This is a relatively small proportion of the proposal area. Because the section has not been previously entered, snags have not been decreased by past management activities and firewood cutting. Therefore, snag numbers in the section should be similar to historical conditions. Given that the area with mixed severity fire disturbance emulation (and potential snag decreases) is comparatively small, and that the remainder of the section has not experienced human-caused snag decreases, adequate numbers of large snags should be available throughout the section post-harvest.

Building 2.5 miles of road could potentially decrease snag numbers, because woodcutting could occur. However, slashing the road would ensure that vehicle access would be minimal, so that no woodcutting should occur post-harvest. Use of mechanized logging equipment may decrease coarse woody debris by breaking down pieces that are in the way of harvest activities. This would be partly mitigated by return skidding slash to all harvest units, maintaining on-site large cull pieces, and retaining 249 acres of unentered habitat. An average 10 tons per acre of coarse woody debris would be found in all units post-harvest.

In summary, there may be direct negative effects to snag and coarse woody debris if snags are removed for safety or coarse woody debris is disturbed during logging. However, all safe snags would be left in harvest units. Negative effects would be mitigated by benefits of thinning and by retaining some areas unentered.

Cumulative Effects

In the proposal area, there may be a cumulative benefit to recruitment of large-sized snags in the future by thinning now. In stands proposed for mixed severity fire disturbance emulation, the length of time that stands could provide large-sized snag recruits would be increased. Therefore, the cumulative benefit for snags would extend longer into the future. Unit-wide, other recent sales are located several miles away, so that snag numbers there would not affect the proposal area. In the analysis area, the Harvey-Eightmile Timber Sale did not enter the Moyie-Grouse and Bateman areas, so that no snags were affected. Cumulative effects would be similar to the no action alternative. Industrial private lands in the analysis area provide almost no snags, and likely would not provide snags in the near future. This is a negative cumulative effect to the snag resource.

Noxious weeds:

In Alternative B, weeds could be spread by harvest activities, which would occur in previously-unroaded and unentered stands. Ground disturbing activities have the potential to introduce or spread noxious weeds in susceptible habitat types. Once introduced, noxious weeds can displace native vegetation. For both action alternatives, an Integrated Weed Management (IWM) approach was considered by DNRC to meet the intent of the Noxious Weed Law. For this project the emphasis is on a combination of prevention and revegetation to keep the project area weed free. If spot outbreaks of weeds occur, DNRC would evaluate the site for most effective weed management, and may use spot application of herbicides to eliminate weeds on a site specific basis. For the action alternatives, the following IWM measures would be implemented to reduce existing weeds and limit the possible spread of noxious weeds in the project area.

- All road construction and harvest equipment would be cleaned of plant parts, mud and weed seed to prevent the introduction of noxious weeds. Equipment would be subject to inspection by forest officer prior to moving on site.
- All newly disturbed soils on road cuts and fills would be promptly reseeded to site adapted grasses to reduce weed encroachment and stabilize roads from erosion.
- Weed treatment measures may include spot herbicide treatment of noxious weeds. Where herbicide

treatments are required by the forest officer, herbicide must be applied under the supervision of a licensed applicator following label directions in accordance with Department of Agriculture regulations, applicable laws and rules and regulations of the Granite County weed board.

- Monitor the sites for 2 years to evaluate weed control measures implemented and determine if any new noxious weeds establish that were not previously identified.

Cumulative Effects

Unit-wide, other recent sales are located several miles away, so that weed distribution there would not affect the proposal area. In the analysis area, the Harvey-Eightmile Timber Sale did not increase noxious weeds, because the Moyie Grouse and Bateman areas were not entered. Cumulative effects would be similar to the no action alternative. Industrial private lands in the vicinity provide a constant weed source. This is a negative cumulative effect to the non-weed resource. With mitigation (closing roads, weed spraying, and power-washing), the risk for a cumulative increase in weeds would be low.

Road-building

For Alternative B, 2.5 miles of road would be built. Access would potentially be limited because the roads would be behind locked gates. However, the presence of a road would make travel by foot, horseback, mountain bike, or trespass vehicles relatively easy. Therefore, road construction, even if closed, provides more access to of hundreds of acres of land that were previously difficult to access. "Slashing" the road surface can mitigate the presence of a road. With enough slash present, even foot or horseback traffic is discouraged or eliminated. Thus, there would be a short, direct negative impact to the area by building the 2.5 miles of road. This would be nearly eliminated once the roads were slashed.

Cumulative Effects

With proposed road-slashing in the project area, there would be no measurable negative cumulative effect to habitat quality or security from road-building. Unit-wide, other recent sales are located several miles away, so that road density there would not affect the proposal area. In the analysis area, the Harvey-Eightmile sale did not build any roads in the Moyie Grouse and Bateman areas. Cumulative effects would be similar to the no action alternative. Industrial private lands in the vicinity are heavily roaded. The high road density is a negative cumulative effect to habitat quality and security. Negative effects are partly mitigated by closing the roads with a locked gate. However, without slashing, the road surface is still available for trespass vehicles, vehicles with administrative access, and foot, bicycle and horse traffic.

Alternative C: Harvest no large trees (except incidentally to road building or corridor placement), retain unentered corridor area, treat lodgepole as in Alternative B:

Old Growth:

As in Alternative B, Alternative C would retain unentered 249 old growth acres that occur in a large contiguous patch. Effects would be similar to the no action alternative. Old growth components would remain intact except for natural processes. Thinning surrounding stands should decrease the risk of stand replacing fire from moving into the unentered area. Large trees may experience competition stress in the unentered area, but overall average numbers may not change because competition would decrease in thinned areas.

Approximately 307 acres of old growth would be harvested and all large trees (> 20 inches d.b.h.) would be retained except for operational constraints. That is, some large trees may be removed incidentally for road or corridor placement, but none would be targeted for removal at this time. In these areas, there would be little measurable direct change to old growth components. Coarse woody debris may decrease because heavy equipment might break up pieces on the ground. However, logging slash returned to the units would partly mitigate for this effect. Coarse woody debris may increase if snags are knocked over for safety considerations. Changes either way would likely be small. Large cull pieces should be

retained on the site. Overall, thinning small to medium-sized trees should decrease competition stress to the remaining large trees. With thinning, 14-16 inch d.b.h. trees that are retained would have a better chance to grow into larger size classes and therefore eventually into larger snag recruits. Removal of ladder fuels by harvest would decrease the risk of a stand-replacing fire as well.

All of the lightly-harvested stands would meet the working definition of old growth post-harvest. However, with disturbance, some old growth components may decrease post-harvest, including decadence, downed woody material, snags, overstory cover, and mid-canopy structure. Therefore, in the short-term, entered stands may have fewer old growth attributes than unentered old growth. There would be 249 unentered old growth acres in the proposal area post-harvest.

As in Alternative B, approximately 80 old growth acres would be logged with a cable system. Overall, these stands would meet the working definition of old growth post-harvest. However, structurally the stands would have 10-foot wide clearings spaced every 100 feet, for the cable corridor. Therefore, approximately 10% of the area in a cable system would have an open structure after harvest. Neighboring trees would contribute canopy cover on the edges of the corridor.

In Alternative C, no large trees would be cut to create young or open stands. Depending on the life expectancy of old growth habitat as a whole, there may be a net cumulative decrease in old growth in the future if younger stands are not available for recruitment. However, given that old growth stands have occupied the site for at least 50 years, it is likely that they could occupy the area for another 20 years, or until the time of the next entry. If old growth appears to be decreasing at that time, younger stands could be created. Given that this alternative would thin understories and decrease competition stress to large trees, it is likely that the life expectancy of old growth habitat as a whole could increase. Therefore, it may not be necessary to create younger stands now for recruitment to future old growth.

In summary, under Alternative C there would be a slight direct negative effect to old growth if large trees are incidentally removed or where coarse woody debris is broken up by harvest activities. These effects would be mitigated by reduced competition stress to large trees resulting from understory thinning, return skidding of slash, and by retaining large cull pieces on site. Direct effects to old growth habitat would be further mitigated by not entering 249 old growth acres that occur in a large contiguous patch.

Cumulative Effects

In the proposal area, there may be a cumulative decrease in old growth in the future if younger stands are not created now by harvest. This would depend on the life expectancy of old growth. With planned thinning, old growth trees would experience less competition stress, so that old growth stands may last longer into the future. Thus, with thinning the need for younger recruitment stands may be less. Thinning may mitigate for potential cumulative decreases in old growth habitat caused by not creating younger stands with harvest now.

Unit-wide, recent past harvest at Flat-Pardee, Tarkzeau, West Lubrecht, Potomac, and Greenough Timber Sales has altered 239 acres of ponderosa pine old growth. In addition, 105 acres of old growth Douglas-fir were converted to old growth ponderosa pine by harvesting old growth Douglas-fir that was in "ponderosa pine appropriate stands". All treated old growth acres meet the working definition for old growth post-harvest.

In the analysis area, the Harvey-Eightmile Timber Sale, Deerlodge National Forest, did not remove old growth from the Moyie-Grouse or Bateman Creek elk management unit (USDA For Serv. 1991: p.2-17, Canfield 1991). Effects would be similar to the no action alternative. Industrial private lands in the analysis area have no old growth habitat. The soonest any old growth could be recruited there would be at least 140 years. This is a negative cumulative effect to the old growth resource. Negative effects are

partly mitigated by old growth habitats available on Forest Service land in the analysis area (Figure 3-3). However, distribution of old growth would be improved if some were retained or recruited on private lands.

Unit-Wide Effects to Old Growth

Effects of the proposed harvest to old growth acres for Missoula Unit are summarized in Table 4-4. Missoula Unit currently has 1850 fewer acres of old growth ponderosa pine type than necessary to meet the minimum SLFMP commitment (Table 3-4). There would be no opportunity to convert more old growth ponderosa pine from current Douglas-fir old growth in the proposal area. In both action alternatives, all current ponderosa pine old growth would meet the working definition for old growth post harvest (Table 4-4), for the following reasons:

- All large ponderosa pine trees would be retained. (Recall that in Alternative B, any large trees to be removed are Douglas-fir.),
- Snags and cull trees would be retained on site,
- Coarse woody debris would be return skidded after harvest, and
- Thinning would decrease competition stress near large trees

Missoula Unit needs 29 acres of old growth lodgepole pine to meet SFLMP commitments. No old growth lodgepole pine stands occur in the proposal area, although there are stands that are 125 to 130 years old. Old growth lodgepole pine would be recruited in the DeBorgia portion of the Missoula Unit, because habitat patches and tree sizes are larger there. Therefore, stands near DeBorgia are more suitable for old growth recruitment. Missoula unit also needs 37 acres of western white pine old growth. Western white pine type would need to be recruited where there are "appropriate western white pine stands". None occur in the proposal area. After harvest of either action alternative, Missoula Unit would continue to exceed the minimum SFLMP commitment of Douglas-fir old growth by several thousand acres (Table 4-4).

Table 4-4. Effects of proposed Tyler Creek Timber Sale on Old Growth by Cover Type, Missoula Unit

COVER TYPE	ACRES			
	EXISTING OLD GROWTH	MEETS WORKING DEFINITION OF OLD GROWTH AFTER IMPLEMENTATION OF PROPOSED TYLER CREEK TIMBER SALE		MINIMUM OLD GROWTH COMMITMENT
		ALT B	ALT C	
ALP/NC	591	591	591	130
DF	3787	3735	3787	229
HW	77	77	77	0
LP	5	5	5	34
MC	471	471	471	182
PP	8129	8129	8129	9979
WL/DF	4002	4002	4002	2458
WWP	0	0	0	37
TOTAL	17062	17010	17062	13049

Overstory cover and movement corridors

Alternative C would retain (the same as B) unentered a 249-acre corridor of old growth habitat from the northeast corner of Section 36, south to the roadless area in Grouse Gulch. Habitats in other ownership

adjacent to the northeast corner are somewhat fragmented, but are the most likely areas to allow movement to the Clark Fork River. The proposed corridor in Section 36 includes ridgetops that could provide movement areas for species such as big game, lynx, wolverine or marten.

Stands adjacent to the proposed corridor are proposed for treatment that emulates a cool underburn in Alternative C. Post-harvest stands would likely not decrease the utility of the unharvested corridor. Thinning adjacent to the unharvested corridor area would decrease the risk of occurrence of a stand-replacing fire. Therefore, thinning would contribute to a net cumulative benefit for the corridor. Both Alternative B and C would require roads to be built that would cross the corridor. Any new roads would be "slashed" after harvest activities are complete. That is, slash would be placed on the road surface for its entire length. This would make travel on the road by foot, bicycle, horseback or vehicle almost impossible. Therefore, habitat security should be similar post-harvest in the corridor area. Both harvest alternatives retain a light-harvest buffer between the clearcut lodgepole stands and the corridor. In summary, there would be some direct negative effects to movement corridors from Alternative C. Retaining the unentered corridor would mitigate negative effects.

Cumulative Effects

In the proposal area, there would be a cumulative benefit to overstory cover by thinning that would reduce competition stress and fire risk. Unit-wide, other recent sales are located several miles away, so that corridor habitat is not affected in the proposal area. In the analysis area, The Harvey-Eightmile Timber Sale did not affect overstory cover in the Moyie-Grouse or Bateman areas. Cumulative effects would be similar to the no action alternative. Industrial private lands in the vicinity provide almost no overstory cover. This is a negative cumulative effect to the overstory cover and corridor resource. Negative effects are somewhat mitigated by cover provided on Forest Service lands. However, corridor function would be improved if more habitat were retained or recruited on private lands.

Snags and coarse woody debris:

As in Alternative B, Alternative C would retain snags and coarse woody debris unaltered in 249 old growth acres in the non-entry corridor. In 386 acres proposed for harvest, there would be some direct negative effect to snags and coarse woody debris if snags are removed for safety or debris is disturbed during harvest. Effects would likely be minor, because few snags are usually felled during harvest operations. Large trees would benefit from decreased competition stress resulting from thinning. They would continue to grow and potentially become large-sized snags and coarse woody debris. Without thinning, the large trees would continue to compete with understory trees, and may become snags sooner than with thinning. However, without thinning, fewer medium-sized trees would be expected to grow into large sized trees, so that the supply of large snags and coarse woody debris could decrease with time.

Trees with obvious defect (usually sweep, some rot) in the butt section would be "high stumped" and left standing, rather than low stumped and "long-butted". DBH would vary. However, large trees would be retained regardless of defect. Some of these would be recruited into snags. This would help mitigate for potential snag removal, and eventually some would provide coarse woody debris.

Building 2.5 miles of road could potentially decrease snag numbers, because woodcutting could occur. However, slashing the road would decrease or eliminate vehicle access, so that woodcutting would not likely occur post-harvest. Use of mechanized logging equipment could decrease coarse woody debris by breaking down pieces that are in the way of harvest activities. However, any snags knocked over for safety would increase coarse woody debris. Any decreases would be partly mitigated by return skidding slash to all harvest units, maintaining on-site large cull pieces, and retaining 249 acres of unentered habitat. An average 10 tons per acre coarse woody debris would be found in all units post-harvest.

In summary, there may be some direct negative effect to snag and coarse woody debris, if snags are removed for safety reasons, or coarse woody debris is disturbed during logging. These would be mitigated by benefits of thinning and by retaining some areas unentered.

Cumulative Effects

In the proposal area, harvest would have a cumulative benefit to large trees (and potentially large snags and coarse woody debris) by thinning. However, no younger stands would be created, in contrast to Alternative B. Depending on the life expectancy of old growth, there may be a long-term cumulative decrease in recruitment of large-sized trees (and ultimately snags), if no young stands are created. The magnitude of effects would depend on the life expectancy of large trees and snags. With thinning, competition stress would decrease, so trees would live longer and provide snags farther into the future. Thus, the need for creating younger stands now may decrease with thinning.

Unit-wide, other recent sales are located several miles away, so that snag numbers there would not affect the proposal area. In the analysis area, the Harvey-Eightmile Timber Sale did not affect snags in the Moyie-Grouse or Bateman areas. Cumulative effects would be similar to the no action alternative. Industrial private lands in the vicinity provide almost no snags. This is a negative cumulative effect to the snag resource. To be effective, snags need to be distributed across the landscape--on every 5- to 25-acre parcel of land (Bull et al. 1997:28). Therefore, negative effects on private lands would not be mitigated until large trees and snags were produced there.

Noxious weeds:

In Alternative C, (as well as Alternative B), weeds could be spread by harvest activities, which would occur in previously-unroaded and unentered stands. Ground disturbing activities have the potential to introduce or spread noxious weeds in susceptible habitat types. Once introduced, noxious weeds can displace native vegetation. For both action alternatives, an Integrated Weed Management (IWM) approach was considered by DNRC to meet the intent of the Noxious Weed Law. For this project the emphasis is on a combination of prevention and revegetation to keep the project area weed free. If spot outbreaks of weeds occur, DNRC would evaluate the site for most effective weed management, and may use spot application of herbicides to eliminate weeds on a site specific basis. For both action alternatives, the IWM measures listed in Alternative B would be implemented to reduce existing weeds and limit the possible spread of noxious weeds in the project area.

Cumulative Effects

Unit-wide, other recent sales are located several miles away, so that weeds there would not affect the proposal area. In the analysis area, the Harvey-Eightmile sale did not enter the Moyie-Grouse or Bateman areas, so no weed spread could occur. Industrial private lands in the analysis area provide a constant weed source and negative cumulative effect to non-weed resources. Negative effects are somewhat mitigated by power washing equipment, spraying roads, and slashing roads.

Road-building

For Alternatives B and C, 2.5 miles of road would be built. Access would potentially be limited because the roads would be behind a locked gate. However, the presence of a road would make travel by foot, horseback, mountain bike, or trespass vehicles relatively easy. Therefore, road construction, even if closed, can provide more access to of hundreds of acres of land that were previously difficult to access. "Slashing" the road surface can mitigate the presence of a road. With enough slash, even foot or horseback traffic is discouraged or eliminated. Thus, there would be a short, direct negative impact to the area by building the 2.5 miles of road. This would be nearly eliminated once the roads were slashed

Cumulative Effects. In the project area, proposed road-slashing would mitigate negative cumulative effects to habitat quality or security from road-building. In the analysis area, roads on private lands are

In summary, there may be some direct negative effect to snag and coarse woody debris, if snags are removed for safety reasons, or coarse woody debris is disturbed during logging. These would be mitigated by benefits of thinning and by retaining some areas unentered.

Cumulative Effects

In the proposal area, harvest would have a cumulative benefit to large trees (and potentially large snags and coarse woody debris) by thinning. However, no younger stands would be created, in contrast to Alternative B. Depending on the life expectancy of old growth, there may be a long-term cumulative decrease in recruitment of large-sized trees (and ultimately snags), if no young stands are created. The magnitude of effects would depend on the life expectancy of large trees and snags. With thinning, competition stress would decrease, so trees would live longer and provide snags farther into the future. Thus, the need for creating younger stands now may decrease with thinning.

Unit-wide, other recent sales are located several miles away, so that snag numbers there would not affect the proposal area. In the analysis area, the Harvey-Eightmile Timber Sale did not affect snags in the Moyie-Grouse or Bateman areas. Cumulative effects would be similar to the no action alternative. Industrial private lands in the vicinity provide almost no snags. This is a negative cumulative effect to the snag resource. To be effective, snags need to be distributed across the landscape--on every 5- to 25-acre parcel of land (Bull et al. 1997:28). Therefore, negative effects on private lands would not be mitigated until large trees and snags were produced there.

Noxious weeds:

In Alternative C, (as well as Alternative B), weeds could be spread by harvest activities, which would occur in previously-unroaded and unentered stands. Ground disturbing activities have the potential to introduce or spread noxious weeds in susceptible habitat types. Once introduced, noxious weeds can displace native vegetation. For both action alternatives, an Integrated Weed Management (IWM) approach was considered by DNRC to meet the intent of the Noxious Weed Law. For this project the emphasis is on a combination of prevention and revegetation to keep the project area weed free. If spot outbreaks of weeds occur, DNRC would evaluate the site for most effective weed management, and may use spot application of herbicides to eliminate weeds on a site specific basis. For both action alternatives, the IWM measures listed in Alternative B would be implemented to reduce existing weeds and limit the possible spread of noxious weeds in the project area.

Cumulative Effects

Unit-wide, other recent sales are located several miles away, so that weeds there would not affect the proposal area. In the analysis area, the Harvey-Eightmile sale did not enter the Moyie-Grouse or Bateman areas, so no weed spread could occur. Industrial private lands in the analysis area provide a constant weed source and negative cumulative effect to non-weed resources. Negative effects are somewhat mitigated by power washing equipment, spraying roads, and slashing roads.

Road-building

For Alternatives B and C, 2.5 miles of road would be built. Access would potentially be limited because the roads would be behind a locked gate. However, the presence of a road would make travel by foot, horseback, mountain bike, or trespass vehicles relatively easy. Therefore, road construction, even if closed, can provide more access to of hundreds of acres of land that were previously difficult to access. "Slashing" the road surface can mitigate the presence of a road. With enough slash, even foot or horseback traffic is discouraged or eliminated. Thus, there would be a short, direct negative impact to the area by building the 2.5 miles of road. This would be nearly eliminated once the roads were slashed

Cumulative Effects

In the project area, proposed road-slashing would mitigate negative cumulative effects to habitat quality or security from road-building. In the analysis area, roads on private lands are extensive. This is a negative cumulative effect to unroaded habitat. However, several sections to the south are not roaded and are likely to remain unroaded and unharvested for the near future (Decision Notice, Harvey Eightmile FEIS, Deerlodge National Forest 1991). This somewhat mitigates the negative effects from roads on private lands. However, habitat quality and security on private land would be improved by minimizing road-building, and subsequently slashing roads after use.

Water Resources Methodology

Assessments are based on Equivalent Clearcut Acres (ECA) and Water Yield (WY) modeling and on-site field reviews of all contributing areas within the proposed analysis area.

Water Quality

Alternative A-No Action

The primary risk to water quality is associated with existing road use during harvest activities. The no action alternative may have impacts on water resources. Existing substandard access roads with inadequate surface drainage and buffer zones could potentially impact water quality and downstream beneficial uses unless mitigation and remedial actions are undertaken.

Alternatives B and C

The action alternatives contain the same amount of treatment acres, but differ by prescriptions. The prescription for action alternative B is to treat approximately 285 acres with Individual Tree Selection harvest, 52 acres with a Shelterwood harvest and 50 acres through clearcut with reserves. This treatment would remove approximately 15-75% of the existing crown cover across each prescription. Action alternative C would treat 337 acres using Individual Tree Selection and 50 acres through clearcutting with reserves.

Harvest units can directly impact water quality if not properly located or buffered. The risk of impacts is greatest along streams, wetlands and lakes. The Streamside Management Zone Law (SMZ Law) regulates forest management activities that occur adjacent to streams, lakes or other bodies of water. All proposed activities would be conducted in accordance with the SMZ law and Rules. All areas requiring SMZ delineation have been field reviewed by DNRC Hydrologist to determine their adequacy in meeting the requirements of the law and satisfying the SFLMP guidance to protect water quality and aquatic resources.

Portions of the sale area are drained by ephemeral draws, swales and wet areas that lack discernable stream channels. Equipment restrictions and designated crossings would be utilized to protect all wet areas and ephemeral draws.

The primary risk to water quality is associated with roads, especially roads constructed along or crossing streams. Both Action Alternatives would include a total 2.5 miles of proposed temporary road. Mitigation measures would be fully utilized to ensure the fullest protection of soil and water resources during the sale activities. All newly construction temporary roads would be ripped, seeded, and slashed at the end of the sale to promote stability and long-term protection to soil and water resources.

DNRC would utilize all reasonable mitigation and erosion control practices during the design, reconstruction and construction of all roads, stream and draw crossings. Site specific design recommendations from DNRC Hydrologist, Soil Scientist and MDFWP Fisheries Biologist would be fully implemented under either action alternative. All stream crossing sites are subject to approval from MDFWP through the permitting process required under the Montana Stream Protection Act. All provisions and mitigation measures stipulated in the 124 permit would be fully implemented.

Approximately 6.0 miles of existing low standard road would be improved under each proposed action to a standard that meets minimum BMPs. Under the DNRC proposal, this road segment would be improved to reduce sediment erosion and delivery to the affected stream channels and draw bottoms. Improvements include, but may not be limited to, installation/reconstruction of road surface drainage features, stabilization of eroding cut and fill slopes and installation of sediment buffer structures i.e. slash filter windrows and/or filter fabric fencing with straw bales (depending on site location). These measures would be determined on a site-specific basis. Mitigation measures are expected to improve long-term water quality.

Some short-term impacts to water quality may occur due to sediment induced at stream crossing and ephemeral draw bottoms during or shortly after new road construction activities. The total 2.5 miles of proposed new road construction for both action alternatives are considered to have minimal risk to water quality and beneficial uses due to the following reasons:

- Road locations provide adequate buffer distances from adjacent stream channels.
- Moderate soil erodibility.
- The ephemeral nature of the adjacent stream channels.
- The proposed new roads are temporary and would be ripped, seeded, water-barred and slashed at the end of the sale.

Proper application of BMPs and site-specific designs and mitigation measures would reduce erosion and potential water quality impacts to an acceptable level as defined by the water quality standards. Acceptable levels are defined under the Montana Water Quality Standards as those conditions occurring where all reasonable land, soil and water conservation practices have been applied.

Erosion control measures aimed at stabilization of existing stream crossings and other improvements to the existing road system are expected to result in long term improvements to downstream water quality and improved protection of beneficial uses. There is little risk of adverse impacts to water quality and beneficial uses occurring as a result of the proposed action alternatives.

Cumulative Watershed Effects:

Results from the ECA/WY analysis show that projected harvest levels are below those levels normally associated with detrimental water yield increases and thus channel impacts. Expected water yield increases over current conditions resulting from the proposed sale within each watershed range from 0.1 %-3.4 % for all action alternatives. Tables 4-6 and 4-7 summarize predicted increases in water yield and ECA of each action alternative for each affected watershed.

TABLE 4-6. Watershed ECA/WYI Analysis, Alternative B

Watershed	Proposed Harvest	Proposed Roads	Proposed ECA	Cumulative ECA	Proposed WYI	Cumulative WYI*
Tyler Creek	96 acres	0	74 ac.	1703 ac.	0.1%	5.2%
Genoa Gulch	142 acres	1.0 miles	82 ac.	256 ac.	3.4%	10.4%
Grouse Gulch	126 acres	1.3 miles	67 ac.	152 ac.	1.4%	3.3%
Tendoy Gulch	22 acres	0.2 miles	15 ac.	168 ac.	1.2%	15%

*Water Yield Increase (WYI) is an estimate of percent water yield over natural levels due to management activities.

TABLE 4-7. Watershed ECA/WYI Analysis, Alternative C.

Watershed	Proposed Harvest	Proposed Roads	Proposed ECA	Cumulative ECA	Proposed WYI	Cumulative WYI
Tyler Creek	96 acres	0	67 ac.	1696 ac.	0.1%	5.2%
Genoa Gulch	142 acres	1.0 miles	77 ac.	251 ac.	3.1%	10.1%
Grouse Gulch	126 acres	1.3 miles	67 ac.	152 ac.	1.4%	3.3%
Tendoy Gulch	22 acres	0.2 miles	12 ac.	165 ac.	0.9%	14.7%

Estimated increases in average annual water yield due to timber harvest and road construction in Tendoy Gulch for both action alternatives are near thresholds. All other watersheds are below thresholds set by DNRC for both action alternatives. It is unlikely that the proposed levels of harvest would contribute to detectable increases in water yield or have any measurable influence on downstream channel conditions.

Cold Water Fisheries:

There are no fish-bearing streams draining the state section within the proposed sale area. All drainage features within the proposed sale area are discontinuous with no surface delivery to any fish-bearing streams. Therefore, it is unlikely that either action alternative would affect large woody debris recruitment, shade, or in-stream temperature of fish-bearing streams.

The action alternatives include improvements to mitigate problems associated with the existing road system. These improvements are expected to reduce the risk of additional impacts to fish-bearing streams during the proposed sale activities. In addition, these improvements would have a minor long-term positive influence on water quality and fisheries habitat in the watersheds draining the proposed sale area.

Soils

Alternative A- No Action

The no-action alternative would have minimal effect to soils. Existing roads require some maintenance and additional drainage. With no action, roads would continue to erode and deteriorate.

Alternatives B and C -Harvest effects

Timber harvest, slash disposal and site preparation can cause rutting, erosion, soil compaction and displacement. Potential for soil impacts are higher on tractor units and below average on cable units. On tractor units the area of detrimental impacts would be limited to 15% or less of the harvest area, by implementing mitigation measures including season of use and skid trail limitations. Units that would be cable logged would have negligible effect on soils. Broadcast burning would have a short term beneficial effect on soil nutrients.

Economics

The costs related to the administration of the timber sale program are only tracked at the land office and statewide levels. The DNRC does not keep track of project-level costs for individual timber sales. Costs, revenues, and estimates of return are estimates intended for relative comparison of alternatives. They are not intended to be used as absolute estimates of return.

Estimated stumpage values were based on recent comparable timber sales on Missoula Unit. In addition, stumpage rates were adjusted due to differences in logging systems, log quality, and other factors. The estimated stumpage value including forest improvement fees would be \$245.00/Thousand Board Feet (MBF) for Alternative B and \$243.00/MBF for Alternative C.

The statewide revenue/cost ratios for DNRC for the last 5 fiscal years are listed below. Total return to the trust for this proposal is listed in Table 4-8.

FY 94	FY95	FY96	YF97	FY98
\$2.68	\$2.07	\$1.68	\$1.89	\$1.72

Table 4-8. Total return to the trust, by alternative

Alternative	Volume Harvested	Stumpage Value*	Total Return to the Trust
A	0 MBF	\$0.00	N/A
B	2.5 Million Board Feet (MMBF) (2,500 MBF)	\$245.00	\$612,500.00
C	2.3 MMBF (2,300 MBF)	\$243.00	\$558,900.00

*Stumpage values are adjusted by log quality, differences in logging systems, and cost of forest improvement. Therefore, values differ between action alternatives.

Appendix A

Threatened and Endangered Species Considerations

Affected Environment:

Bald eagles (federally-threatened) could occur in the proposal area, but are not closely associated with upland forest habitats. Bald eagles typically nest near (within 1 mile) and forage on large bodies of water, usually greater than 40 acres in size. Bald eagles winter and nest along the Clark Fork River. The river is approximately 1.5 miles from the proposed project area, but no nests are in the vicinity. Bald eagles could forage on carrion in the proposal area, but eagles would be more likely to forage closer to the river. To date, no bald eagles have been seen in the proposal area, and none were recorded near the proposal area in a Montana Natural Heritage Program (MNHP) Database search. Bald eagles are listed as breeding in this ¼, however (Montana Bird Distribution Database (MBDD, mtnhp@nris.mt.gov, latilong 26-B). Large-sized ponderosa pine trees are present in the proposal area, and this habitat component may be used by bald eagles for roosting and nesting. Roosting areas may be located miles from river and lake foraging areas.

In the analysis area, private lands have almost no bald eagle habitat. Forest Service lands were not entered in the analysis area.

Peregrine falcons (federally-threatened) are usually associated with cliffs or waterfowl concentration areas. Although the Clark Fork River produces waterfowl, it does not likely support enough waterfowl

and shorebirds for resident peregrine falcons. No cliff habitat occurs in the area. To date, no peregrine falcons have been seen in the proposal area, and none were recorded in a MNHP database search for the proposal area. The MBDD does not list peregrine falcons in this ¼ latilong.

Grizzly bears (federally-threatened) may occur in the area. They are wide-ranging mammals that use forest uplands. Habitats can be adversely impacted by increases in human access and timber harvesting activities. No grizzly bears have been recorded in the proposal area (MNHP Database). The nearest grizzly bear Subunit in the Northern Continental Divide Ecosystem Recovery Area lies more than 25 miles northeast of the project area. The low road density makes the proposed project area potentially suitable for grizzly bears. However, human activities within a 25-mile radius of the project area render near-term frequent use by bears unlikely. Nevertheless, Grizzlies could move through the area. Habitats that are particularly attractive to grizzly bears include moderately wide or low-gradient riparian zones, and avalanche chutes—both areas that provide seasonally important bear foods. These preferred habitats are not found within Section 36. The proposal area does not contain big game winter range with high concentrations of ungulates (USFS 1991:111-30), another habitat potentially used by grizzly bears. However, many big game animals use the proposal area, particularly for security during the hunting season (Canfield 1991; Dan Hook, DFWP, pers. comm., January 1999). Big game animals provide important prey for grizzly bears.

In the analysis area, private lands have almost no residual cover for grizzly bear habitat. Forest Service lands were not entered in the analysis area.

Gray wolves (federally-endangered). Gray wolves are wide-ranging carnivores that use a variety of forest upland habitats. Low road densities coupled with available prey (small mammals and big game) make the proposed project area suitable for use and denning by gray wolves. There are no documented wolf dens in the analysis area, although wolves could use the area (E. Bangs, USFWS pers. comm., July 12, 1999).

In the analysis area, private lands have almost no residual cover for gray wolf habitat. Forest Service lands were not entered in the analysis area.

Mitigations common to all threatened and endangered species: If any threatened or endangered species were encountered during project planning or implementation, all project-related activities would cease and a DNRC wildlife biologist would be informed immediately. Additional habitat protection measures would be designed and implemented as appropriate.

Prior to logging, the DNRC would confirm the current wolf status in the vicinity with the U. S. Fish and Wildlife Service, Helena.

Environmental Consequences

Alternative A—No Action

Bald Eagle: There would be no change from the current situation. Without thinning, however, large-sized trees would continue to undergo competition stress. The number of large-sized trees could eventually decrease, a potential cumulative negative impact to this habitat component. However, changes would be gradual. Even with some loss of large trees, there would likely be ample numbers to support roosting or nesting bald eagles. Therefore, there would be no direct or cumulative negative effects to bald eagles as a result of this alternative. Cumulative effects to threatened and endangered species are summarized in Table A-1.

Alternatives B and C

Bald Eagle: Large-sized ponderosa pine trees are used by bald eagles for roosting and nesting, and this

habitat component would be retained in both proposals. Thinning from under these trees would reduce competition stress to large trees, a net cumulative benefit to this resource. Therefore, no direct or cumulative negative impacts to bald eagles are expected to occur as a result of these alternatives.

Peregrine Falcon Because peregrine falcons likely would not occur in the area, no direct or cumulative impacts are expected to occur to them as a result of any alternative.

Alternative A—No Action

Grizzly Bear and Gray Wolf

There would be no change from the current situation. Big game forage would continue to decrease in the proposal area with increased tree density (assuming no fires). However, ample big game forage would be available in the analysis area. Habitat security would continue to be high in the proposal area, so there would continue to be a cumulative benefit to both species under the no action alternative.

Alternatives B and C:

Approximately 2 to 3 miles of road would be built, so that habitat security for both species may decrease after harvest. Roads would be “slashed”, so that vehicles, bikes, and horse and foot traffic would remain much as it is now. Therefore, changes in security would be mitigated. However, sight distances through stands would increase, so that overall security would decrease. In Alternative B, 52 acres treated with mixed severity fire emulation would be more open than other treated Douglas-fir acres in Alternative B and C. Cover for big game--prey for both species--would be retained in scattered thickets, in unentered corridors, and in the adjacent roadless areas. Elk security cover is currently approximately 34% in the Moyie-Grouse Big Game Herd Unit (Canfield 1991). If no habitat in Section 36 were counted as suitable after harvest, then security cover levels for elk (prey species) would decrease to 31%. This amount exceeds the 30% level recommendation for elk by Hillis et al. (1991). Given proposed mitigation measures in both alternatives—a large unentered corridor and road slashing--it is likely that some security habitat would remain post-harvest. Therefore, effects to cover important to big game would be small. Big game forage might be expected to increase where canopies are opened and more light reaches the understory. No critical big game winter range (i.e., areas attractive to wolves and bears during spring) is included within the project area. Thus, there would be a slight direct negative effect due to increased sight distances, but no cumulative measurable negative impacts to grizzly bears or gray wolves as a result of alternatives B or C.

Table A-1. Cumulative Effects to Threatened and Endangered Species.

Species	A. No Action	Alternatives B and C
Peregrine Falcon	No effect because peregrine falcons are not likely to occur in the project area.	No effect because peregrine falcons are not likely to occur in the project area.
Bald Eagle	Without thinning, large-sized trees would continue to undergo competition stress. If the number of large-sized trees decreased, this would be a potential cumulative negative impact. However, changes would be gradual. Even with some loss of large trees, there would likely be ample to support roosting or nesting bald eagles. Therefore, there would be no direct or cumulative effects to bald eagles. Private lands in the analysis area provide no bald eagle habitat, a net cumulative detriment to bald eagles. Forest Service lands, however provide several uncut sections of habitat, a cumulative benefit relative to cut-over lands in the analysis area.	No negative cumulative effect because large PIPO trees would be retained, and mitigations would provide security if a nest were found. Private lands in the analysis area provide no bald eagle habitat, a net cumulative detriment to bald eagles. Forest Service lands, however provide several uncut sections of habitat, a cumulative benefit relative to cut-over lands in the analysis area.
Grizzly Bear and Gray Wolf	In the proposal area, decreased big game forage with decreased sunlight. However, ample forage is available on cutover adjacent habitat. Thus, no cumulative change. Habitat security would continue to be high in the proposal area, a cumulative benefit. In the analysis area, cutover lands provide no residual cover and are highly roaded (although closed with a gate). These constitute a net cumulative detriment to gray wolves and grizzly bear habitat security and quality. No habitat was changed in the analysis area from the Harvey-Eightmile area, a net cumulative benefit to elk (prey species) security.	In the proposal area, slight direct negative effect due to increased sight distances. No cumulative measurable negative impacts with mitigations including: <ul style="list-style-type: none"> • a large unentered corridor; • connectivity to a 6,000-acre roadless area; • road slashing; • possible timing restrictions; • possible buffers In the analysis area, private lands provide no residual cover and are highly roaded (although closed with a gate). These constitute a net cumulative detriment to gray wolf and grizzly bear habitat security and quality. No habitat was changed in the analysis area from the Harvey-Eightmile area, a net cumulative benefit to elk (prey species) security.

Sensitive Species Considerations

Pileated Woodpecker

Affected Environment

Pileated woodpeckers may occur in the proposal area. However, they are associated with stands dominated by mature to old growth ponderosa pine or western larch, not Douglas-fir. The birds prefer large-sized ponderosa pine and western larch snags and coarse woody debris for feeding, roosting and nesting. Douglas-fir can be used for feeding. Although individual old ponderosa pine or larch trees occur in the section, pine or larch-dominated stands are absent. The proposal area is predominantly north-facing, composed of cool, high elevation, moist to dry Douglas-fir types. Given site conditions, pine or larch were likely never abundant in the area. Therefore, the area would not be considered prime habitat for pileated woodpeckers even though it is composed mostly of old growth stands. The MBDD lists the pileated woodpecker as present but without evidence of breeding in this ¼ latilong.

In the analysis area, private lands have almost no pileated woodpecker habitat. Forest Service lands were not entered in the analysis area.

Environmental Consequences

Alternative A—No Action

There would be no direct changes to pileated woodpecker habitat. Without thinning, large-sized ponderosa pine and western larch would continue to decline. Recruitment of these species as snags would be a cumulative benefit to pileated woodpecker habitat. However, positive effects would be short-lived, because without thinning, these tree species would not be recruited to the stands. In fact, these tree species would likely be permanently lost. This would cause a net cumulative decrease in pileated woodpecker habitat over time, although preferred tree species may never have been abundant in the area. See Table A-2 for cumulative effects to all sensitive species, including the pileated woodpecker.

Alternatives B and C

Both proposals would retain all of the ponderosa pine or western larch greater than 20 inches d.b.h., except those removed incidentally to road or corridor placement. Alternative B would remove some large Douglas-fir, but that species is not preferred by pileated woodpeckers for nesting. No snags would be removed unless they were a danger to safe harvesting operations. Some pieces of coarse woody debris would be recruited to stands by return skidding. Therefore, preferred pileated woodpecker habitat should not be directly decreased by either harvest. Preferred tree species would increase gradually, due to thinning. Benefits would be 2-fold--decreased competition stress to pine and larch trees, and increased seedling establishment by opening stands. Roads would be built for both alternatives, so that snags could potentially be removed. However, slashing the road surface would preclude vehicle travel. Therefore, with either action alternative, there would be no appreciable direct negative effects to this species, and there would be a cumulative benefit for maintaining and recruiting preferred tree species.

Flammulated Owl

Affected Environment

Flammulated owls occur in mature to old growth ponderosa pine and mixed pine and Douglas-fir stands.

The birds nest in cavities, and prefer those excavated by pileated woodpeckers where available. Nest trees in 2 Oregon studies were 22-28 inches d.b.h. (McCallum 1994). Habitats used have open to moderate canopy closure (30 to 50%) with at least 2 canopy layers, and often are adjacent to small clearings. In addition, stands used often have a shrub understory. An open forest structure with shrubs contributes to producing insects, the main prey of flammulated owls. Stands composed of preferred flammulated owl habitat types (dry Douglas-fir types) occur throughout the project area. However, the

MBDD does not list flammulated owls in this ¼ lat/long.

In the analysis area, private lands have almost no flammulated owl habitat. Forest Service lands were not entered in the analysis area. No flammulated owls were detected by the Forest Service in 3 nights of calling during planning for the Harvey-Eightmile Timber Sale (USDA 1991)

Mitigations common to both action alternatives

If active owl or other raptor nests were located, activities would stop until the biologist and the sale administrator could visit the site. Nest trees and all overstory trees in a 100-foot radius would be retained. Timing restrictions or nest stand protections may be implemented as well.

Environmental Consequences

Alternative A—No Action

There would be no direct change from current conditions. With time and continued fire suppression, openings would gradually fill with trees, so that owl foraging habitat would decrease. Large-sized Douglas-fir trees would continue to compete with understory trees, so that more may die than if understories were thinned. This would increase nesting and roosting habitat in the short term, but large-sized trees would not continue to be grown without thinning. Therefore, nesting and roosting habitat would decrease in the long term. Large-sized ponderosa pine would become snags, but the tree species would eventually be lost from the site. The area would have too much shade to establish young ponderosa pine trees. In summary, there eventually would be a cumulative decrease in owl foraging and nesting habitat with the no action alternative.

Alternatives B and C

Both harvest alternatives would retain all large-sized ponderosa pine, and many large-sized Douglas-fir trees. Alternative C would have more large fir post-harvest than B. Both would have suitable nesting and roosting habitat post-harvest. Large-sized trees (potential nest and roost sites) would benefit from thinning understory trees and reduced competition stress. Foraging habitat (open areas) would increase after harvest. Alternative B would provide more foraging habitat than Alternative C. Both alternatives would build 2.5 miles of road. Increased access may allow woodcutters to remove snags, even if roads are closed. Slashing the road surface would mitigate this activity. Therefore, there would be no appreciable direct detrimental effects to this species. Thinning would result in a cumulative benefit for foraging habitat, and recruiting and maintaining nesting and roosting habitat long-term.

Lynx

Affected Environment

Lynx have been studied in the Garnet Range adjacent to the analysis area. Potential denning habitat consists of relatively dense stands (at least 50% canopy closure) of mature to old growth structure at 5,000 feet elevation or higher, in spruce-fir habitats that contain numerous downed logs. Elevations in the project area range from 5,000 to 6,000 feet elevation. However, only some stands are the cool and moist types most preferred for lynx denning habitat (SFLMP Sensitive Species Guidance SS-23). The ridge along the divide between Tyler and Harvey Creeks has numerous rock outcrops, large pieces of downed material, and an overstory of large trees—important components for potential lynx denning habitat. Foraging habitat—areas that support snowshoe hares—is often composed of relatively young, densely stocked stands of lodgepole pine. Several old stands of lodgepole occur in the section, but young trees dominate no stands.

In the analysis area, private lands have almost no lynx cover. Foraging habitat could occur there in 10-15 years. Forest Service lands provide potential lynx denning habitat (USDA 1991), and were not harvested in the analysis area.

Environmental Consequences

Alternative A--no action

Habitats would not directly change from current conditions. Understory trees would continue to grow, however, creating competition stress for larger trees. Fire risk would remain high without thinning. Snags (precursors to coarse woody debris) would be recruited in the short-term, but large-sized trees would eventually decline, and few would be recruited. Security would remain high due to low road densities. Foraging areas would continue to decrease. Without thinning or disturbance, eventually there would be a cumulative decline in potential lynx foraging habitat and in the large tree component of potential denning habitat.

Alternatives B and C

Cover would be removed, so that sight distances would increase in the section. Overstory cover would be retained in the unentered old growth habitat corridor. This includes the Tyler-Harvey ridge, which has numerous rock outcrops, large pieces of downed material, and an overstory of large trees—important components of potential lynx denning habitat. Overstory trees would also be retained by not harvesting Douglas-fir over 20 inches d.b.h., except incidentally to road and corridor placement. More large fir trees would be retained in Alternative C than B. Thinning would enhance large tree retention and recruitment, and would decrease fire risk. In both Alternative B and C, the lodgepole stands would be clearcut with green tree retention. Harvested stands would provide snowshoe hare habitat (lynx foraging areas) in approximately 10-15 years. Alternative B would have 52 acres of fairly open structure habitat post-harvest, which would provide additional foraging habitat.

Although 2.5 miles of road would be built for both alternatives, the road surface would be slashed (slash placed along the entire length of the road surface) after activities were complete. Therefore, vehicles, foot traffic, horse traffic, and bikes would likely not be able to travel along the road.

The gated road is currently closed (and would remain closed) to snowmobile use in the proposal area (DNRC Rules for Recreational Use of State Land, July 1994, p.5, section 26.3.186(b)). The road segment leading to the proposal area is also closed yearlong to vehicles associated with general recreational use (Lolo National Forest Travel Map 1997). Snowmobile traffic packs down snow on travel routes. This makes walking in deep snow easier for predators with smaller foot pads than lynx, including coyotes and bobcats. Therefore, snowmobile travel provides access for other predators into habitats that were previously likely exclusively used by lynx. This is a cumulative negative impact to lynx. In addition, snowmobile closures increase security from disturbance and trapping for lynx. Therefore, closing road use by snowmobiles is a cumulative benefit to lynx habitat.

In summary, there would be direct negative effects to total cover, but direct benefits from thinning stands (enhanced large tree growth, enhanced foraging). Direct negative effects to cover would be mitigated by retaining the unentered old growth corridor and slashing roads. Potential denning habitat would not be affected, because the unentered old growth corridor includes the best potential denning habitat. There would be a cumulative benefit to foraging by harvesting the lodgepole stands. Alternative B would provide additional direct benefit to foraging habitat in the stands proposed for mixed severity fire disturbance emulation.

Fisher

Affected Environment

High-quality fisher habitat consists of late-successional forests with large trees and logs, dense canopies, and close proximity to riparian areas. Elevations are usually less than 6,000 feet. Preferred habitats are not found within the proposal area, because no permanent streams with gentle slopes and high accumulations of downed wood are included. However, fisher could use the following habitats in the proposal area: 1) the intermittent to dry draw in the northeast portion of the section. A portion of the

draw has a developed spring: 2) the ridgetop between the Tyler and Harvey-Eightmile drainages, which has high densities of large coarse woody debris; and 3) areas with a high degree of canopy cover and old growth trees. Almost no fisher habitat occurs on private lands in the analysis area. However, Forest Service land in the analysis area would have potential fisher habitat (USDA 1991).

Environmental Consequences

Alternative A—No Action

There would be no direct change to potential fisher habitat. Gradual changes would be the same as those described in the no action alternative for old growth. That is, there may be a gradual increase in decadence, a net cumulative benefit to fisher. However, with increased competition, fewer trees would grow to the large size preferred by fisher. In addition, the risk of loss through catastrophic fire would increase without thinning. Therefore, there may be a decrease in fisher habitat over time without thinning. Without harvest, low road densities would keep habitat security high for fisher. Overall, there would be little effect to fisher, because preferred riparian habitat is located distant from the proposal area.

Alternatives B and C

Effects to fisher habitat would be similar to effects described for the old growth, overstory cover and corridors, and snag issues above, because components described in those issues comprise potential fisher habitat. Both alternatives would have some direct negative effect to fisher habitat by removing large trees. Alternative B would have more negative effects than C because large trees are targeted for removal in 52 acres of Alternative B. However, Alternative B may provide a long-term cumulative benefit by creating young stands for potential future old growth, overstory cover, and snag recruitment. In both alternatives, there would be a cumulative benefit to large trees from thinning, which would reduce competition stress and the risk of stand-replacing fire. Both alternatives would retain a 249-acre, unentered old growth corridor. This would retain unaltered some of the best potential fisher habitat in the proposal area. In addition, both developed springs in the section would have a 50-foot no entry buffer. This would protect potential fisher habitat in the area.

In summary, for both alternatives there would be some negative direct effects to large tree habitat. Negative effects would be greater in Alternative B than in Alternative C. Thinning and retaining unentered areas would mitigate negative effects from both alternatives. In both alternatives there would be a cumulative benefit to potential habitat from thinning. The benefit would last the longer into the future with Alternative B.

Black-Backed Woodpecker

Affected Environment

Approximately 50 acres are lodgepole cover type, or the most likely potential black-backed woodpecker habitat (Goggans et al. 1989). No recent stand-replacement burns or major insect infestations occur on or near the proposal area. Some individual lodgepole trees were burned, however, during road construction activities (slash pile burning along the road). These trees show evidence of woodpecker activity such as bark scaling, which is characteristic of black-backed woodpeckers. Home range acres and the number of radio-telemetry locations [in parenthesis] for 3 birds in an Oregon study were 178 acres [112], 303 [86] and 810 [124] (Goggans et al. 1989). Therefore, there is currently some scattered potential habitat in the section for this species, but likely not enough habitat to support a resident population of black-backed woodpeckers. The MBDD lists the black-backed woodpecker as possibly breeding in this $\frac{1}{4}$ latilong.

In a recent study of burned forests in western Montana, Hejl and McFadzen (1998) found 46% of all cavity nests (13 bird species including black-backed woodpeckers) were in burned Douglas-fir. The interim report did not list the nest tree species used for each bird species, however. In addition, black-backed woodpeckers foraged most often on burned Douglas-fir (Hejl and McFadzen 1998). Thus, old

growth Douglas-fir habitat in the proposal area could potentially provide black-backed woodpecker habitat, but only if a fairly extensive and hot fire occurred. In contrast, Harris (1982) found that Douglas-fir was not preferred for nesting black-backed woodpeckers, perhaps because the bark was strongly held to the tree after fire. Saab and Dudley (1998) did not list the nest tree species for black-backed woodpeckers, although stands were composed of Douglas-fir and ponderosa pine

In the analysis area, private lands have almost no black-backed woodpecker habitat. Forest Service lands were not entered in the analysis area.

Alternative A—No Action

With no harvest, there would be no direct change to potential black-backed woodpecker habitat. However, the lodgepole stands could undergo an insect infestation or the area could experience a stand-replacing fire. Both events would create preferred black-backed woodpecker habitat. This would be a cumulative benefit to black-backed woodpecker habitat. However, if wildfire or insect outbreaks were suppressed, no cumulative benefit would accrue.

Alternatives B and C

Both alternatives would harvest the lodgepole stands similarly—clearcut with some scattered green trees retained. This would have a direct negative effect to potential black-backed woodpecker habitat. However, the extent of the lodgepole cover is small—only 50 acres. This is likely not enough habitat to support a population of black-backed woodpeckers even without harvest. After harvest, the lodgepole stands would likely regenerate in the clearcut area. However, unless lodgepole is allowed to become decadent or to burn, there would be no cumulative benefit for black-backed woodpecker habitat by stimulating lodgepole growth. Understory thinning should decrease the likelihood of a stand-replacing fire in other stands. This could cause a future cumulative decrease in potential black-backed woodpecker habitat.

Boreal Owl

Affected Environment

Preferred Boreal owl habitat includes spruce and fir habitats from 5,000 to 8,000 feet elevation. The proposal area does not contain preferred cover types, although the elevations are high enough to support boreal owls. Most of the area is Douglas-fir climax habitat type, so that true fir species would not be expected to occur except incidentally. Boreal Owls have been found nesting in mixed conifer and Douglas-fir stands in Idaho (Hayward 1994), and could occur in the project area, however. The MBDD does not list the boreal owl for this $\frac{1}{4}$ lat/long.

In the analysis area, private lands have almost no boreal owl habitat. Forest Service lands were not entered in the analysis area.

Environmental Consequences

Alternative A—No Action

There would be no direct change to potential boreal owl habitat from current conditions. There may be a gradual increase in decadence, a net cumulative benefit to boreal owl habitat. However, there may be a net decrease in habitat over time without thinning (see discussion in the old growth section). Overall, there would be little change to boreal owl habitat, unless the stands were lost to a catastrophic event.

Alternatives B and C

Effects to boreal owl habitat would be similar to effects described for the old growth, overstory cover and corridors, and snag issues above, because components discussed in those issues comprise potential boreal owl habitat. Both alternatives would have some direct negative effect to owl habitat by removing large trees. Alternative B would have more negative effects than C because large trees are targeted for

removal in 52 acres of Alternative B. However, Alternative B may provide a long-term cumulative benefit by creating young stands for potential future owl habitat. In both alternatives, there would be a cumulative benefit to large trees from thinning, which would reduce competition stress and the risk of stand-replacing fire. Both alternatives would retain a 249-acre, unentered old growth corridor. This would retain unaltered some of the best potential boreal owl habitat in the proposal area.

In summary, for both alternatives there would be some negative direct effects to large tree habitat. Negative effects would be greater in Alternative B than Alternative C. Thinning and retaining unentered areas would mitigate negative effects from both alternatives. There would be a cumulative benefit to potential habitat from thinning. The benefit would last longer into the future with Alternative B.

Townsend's Big-eared Bat Affected Environment

There are no known caves (i.e., winter roosting habitat) in the vicinity. Snag habitat (potentially used for summer roosting) could occur in the area. However, without winter habitat (caves) available, it is unlikely that this species would occur in the area.

Environmental Consequences

Alternative A--No action

Effects would be similar as those listed for snags and coarse woody debris. Without harvest, snag habitat would remain as is currently, and would gradually increase with tree competition stress. No roads would be built, so habitat security would remain high.

Environmental Consequences

Alternatives B and C

With harvest, there would be a slight decrease in snag habitat, if any are removed for safety reasons or incidentally to harvest. Without those conditions, no snags would be removed in either alternative. Thinning would decrease stress and increase retention of large trees across the landscape—the forerunner to large snag habitat. Therefore, there would be a short-term negative effect to snag habitat if any are removed, but a long-term benefit from thinning, which would help maintain large trees. In the analysis area, private lands have almost no Townsend's big-eared bat snag habitat. Forest Service lands were not entered in the analysis area.

Table A-2. Cumulative Effects to Sensitive Species

Species	Alt. A, no action	Alts. B and C
Pileated Woodpecker	Without thinning, PIPO and LAOC would not be recruited to the stands and would likely be permanently lost. This would cause a net cumulative decrease in pileated woodpecker habitat over time, although preferred tree species may never have been abundant in the area	Private lands in the area provide almost no habitat for this species. No recent DNRC sales in the vicinity. Harvey-8-mile changed no habitat in the analysis area. Cumulative benefit for maintaining and recruiting large-sized preferred tree species with thinning. Alternative B, would remove more large-sized trees than Alternative C, but an average of 4 per acre would remain after harvest. Therefore, some habitat components would remain even in the most open treatment (post-harvest) of old growth. With mitigations (retain a 249-acre, unentered old growth corridor; slash roads; retain large trees) no negative cumulative effects.
Flammulated owl	Tree growth in openings would lead to a cumulative decrease in foraging (open areas) and nesting (large tree) habitat	Private lands in the area provide almost no nesting habitat for this species. No recent DNRC sales in the vicinity. Harvey-8-mile changed no habitat in the analysis area. With nest site mitigations, road slashing and snag retention, positive cumulative effect to nesting habitat (large trees) by thinning to decrease competition stress, and to foraging areas by creating openings.
Lynx	Understory trees would grow, creating competition stress for larger trees. Large-sized trees and snags would decline, and few would be recruited. Cumulative decrease in large tree component of potential denning habitat. Security would remain high due to low road densities. Cumulative decrease in foraging areas (openings) in the proposal area. Continued availability of potential foraging areas on private land. However, use would be less than expected because residual cover is absent.	Private lands in the area provide almost no cover habitat for this species. These might provide foraging habitat. However, openings on private land may be underused if there is little residual cover available. No recent DNRC sales in the vicinity. Harvey-8-mile changed no habitat in the analysis area. Cumulative benefit from thinning stands in proposal--enhanced large tree growth and enhanced foraging. With mitigations (retain a 249-acre, unentered old growth corridor; retain a 50-foot no entry buffer on springs; slash roads; retain large trees) no negative cumulative effects.
Fisher	Gradual increase in decadence, a net cumulative benefit. However, potential net decreases in habitat over time without thinning. Low road density (high habitat security) is a cumulative benefit. Overall, little effect because preferred riparian habitat is not found near the proposal area.	Private lands in the area provide almost no habitat for this species. No recent DNRC sales in the vicinity. Harvey-8-mile changed no habitat in the analysis area. Cumulative benefit to large trees from thinning in the proposal, which would reduce competition stress and the risk of stand-replacing fire. With mitigations (retain a 249-acre, unentered old growth corridor; retain a 50-foot no entry buffer on springs; slash roads; retain large trees) no negative cumulative effects.

Table A-2. Cumulative Effects to Sensitive Species. continued

Species	Alt. A. no action	Alts. B and C
Boreal Owl	Gradual increase in decadence, a net cumulative benefit. However, net decrease in habitat over time without thinning. Low road densities would keep habitat security high. Overall, there would be little change to boreal owl habitat, unless the stands were lost to a catastrophic event.	Private lands in the area provide almost no nesting or roosting habitat for this species. No recent DNRC sales in the vicinity. Harvey-8-mile changed no habitat in the analysis area. With nest site mitigations and snag retention, positive cumulative effect to nesting habitat (large trees) by thinning to decrease competition stress. With other mitigations (retain a 249-acre, unentered old growth corridor; slash roads; retain large trees) no negative cumulative effects. Benefit would last longer into the future with Alternative B.
Black-back Woodpecker	Lodgepole stands could undergo an insect infestation or the area could experience a stand-replacing fire--a cumulative benefit. If these events were suppressed, then there would be no cumulative benefit, however.	Private lands in the area provide almost no habitat for this species. No recent DNRC sales in the vicinity. Harvey-8-mile changed no habitat in the analysis area. Understory thinning should decrease the likelihood of a stand-replacing fire—a cumulative decrease in potential black-backed woodpecker habitat.
Townsend's Big-eared Bat	Snag habitat would gradually increase with tree competition stress, a benefit. But, large trees would not be recruited, so snag replacement would decrease—a cumulative decrease. No roads would be built, so habitat security would remain high.	Private lands in the area provide almost no habitat for this species. No recent DNRC sales in the vicinity. Harvey-8-mile changed no habitat in the analysis area. With mitigations (retain a 249-acre, unentered old growth corridor; slash roads; retain large trees) no negative cumulative effects. Potential short-term negative effects if snags are lost. However, cumulative benefit from thinning stands, maintaining large trees, and decreased fire risk.

Other Sensitive Species

The following are other sensitive species that occur on some lands administered by the Southwestern Land Office. We assessed potential habitat in the project area and the Montana Natural Heritage Program Database for records of these species. Due to limited available habitat, the species would not likely occur near the project area. Therefore, no effects on any of these species are expected to occur as a result of this project.

Coeur d' Alene Salamander- No fractured rock, waterfalls or splash zones occur in the project area.

Columbian Sharp-Tailed Grouse- No extensive grassland or shrub-steppe habitat occurs in the project area. The only documented population of this species is located near Eureka, MT. A suspected population of Columbian Sharp-tailed Grouse occurs near Helmville, MT. The birds are currently being studied by the MDFWP, to determine which subspecies is present.

Common Loon-No lakes occur in the area.

Ferruginous Hawk- No extensive grassland habitat occurs in the vicinity.

Harlequin Duck- White-water habitat and permanent streams are absent.

Northern Bog Lemming- No fens, bogs or substantial moss-dominated areas are present.

Mountain Plover- No extensive shortgrass prairie or prairie dog towns are present.

Other Wildlife Considerations

Big Game

Affected Environment

Radio telemetry data suggest that the project area provides a movement corridor for big game, from low elevation habitats to the roadless area in Grouse Gulch (Canfield 1991). Elk with transmitters showed a preference for high elevation habitat located away from roads as soon as hunting season began. Bull elk used the security areas throughout the hunting season. No critical big game winter range is included within the proposal area. Some use may occur in winter on the south-facing slopes of Section 36, but these are out of the proposed project area. The proposal area is mostly spring, summer and fall range for elk, mule deer and white-tailed deer. Habitats that qualify as elk security are presented in Figure A-1.

Private lands in the analysis area provide almost no residual cover for big game species. No habitats there qualify as elk security. Forest Service lands in the analysis area were not harvested in the recent Harvey Eightmile Timber Sale. Much of the area is elk security. During planning for that sale, data indicated that the Moyie Grouse Elk Management Unit had 34% elk security cover (Canfield 1991).

Environmental Consequences

No Action

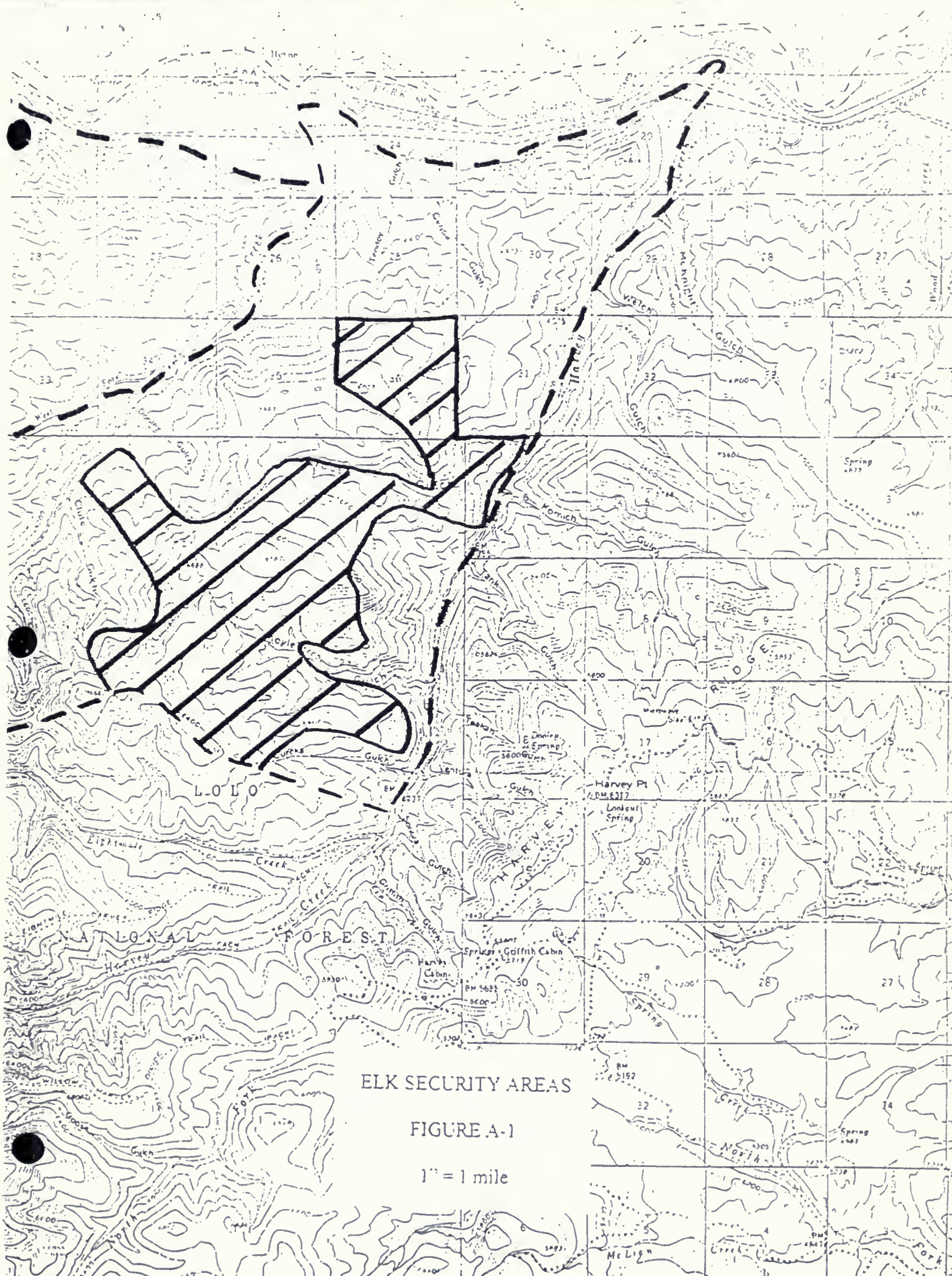
With no action, big game forage would continue to decrease with increasing tree density (assuming continued fire suppression). Habitat security would continue to be high, so there would be a cumulative benefit under the no action alternative. There would be no direct or cumulative negative effects to big game.

Alternatives B and C.

Approximately 2.5 miles of road would be built under this proposal; thus habitat security would decrease after harvest. However, roads would be "slashed", so that vehicles, bikes, and horse and foot traffic would remain much as it is now. Therefore, changes in security would be mitigated. Sight distances through stands would increase, so that overall security would decrease. Cover would be retained in scattered thickets, in unentered corridors, and in the adjacent roadless areas. Big game security cover is currently 34% in the Moyie-Grouse Elk Management Unit (Canfield 1991). If no habitat in Section 36 were counted as security after harvest, then security cover levels would decrease to 31%. This amount exceeds the minimum 30% level recommendation by Hillis et al. (1991). Given proposed mitigation measures—a 249-acre unentered corridor, 50 foot buffers around springs, and road slashing—it is likely that some security habitat would remain post-harvest. Sight distances would increase in some areas, but would remain low in unentered thickets. With road slashing, vulnerability should not increase. No critical big game winter range is included within the proposal area. No cover would be retained in the lodgepole clearcut areas. There would be 52 acres less cover in Alternative B than C. Overall, however, effects to cover important to big game would be small after the proposed harvest. Big game forage might be expected to increase where canopies are opened and more light reaches the understory. Thus, there would be no direct or cumulative measurable negative impacts to big game as a result of alternatives B or C.

Goshawk- Goshawks nest in relatively dense late-successional forests, usually in close proximity to water. Downed logs provide habitat for goshawk prey, and goshawks forage in a variety of forest structural stages, including openings. The project area could provide goshawk habitat. The MBDD lists goshawks as breeding in this $\frac{1}{4}$ latilong.

Private lands in the analysis area provide almost no residual cover for goshawks, although the birds could forage there. Forest Service lands in the analysis area were not entered in the Harvey Eightmile Timber Sale, so that potential nesting habitat would be provided there.



ELK SECURITY AREAS

FIGURE A-1

1" = 1 mile

Environmental Consequences—No Action

Without harvest, goshawk habitat should remain as is currently. Eventually, large trees may become more scarce without thinning. However, goshawks can nest in medium-sized trees as well, so negative effects would not necessarily occur without harvest. There may be a gradual increase in decadence, a net cumulative benefit to prey habitat for goshawks. As stands become more dense, foraging habitat may decrease. However, ample opportunity is available on adjacent private lands. Low road densities associated with no harvest would keep habitat security high for goshawks. Overall, there would be little change to goshawk habitat, unless the stands were lost to a catastrophic event.

Environmental Consequences

Alternatives B and C

Both alternatives would have some direct negative effect to goshawk habitat by removing large trees. Alternative B would have more negative effects than C because large trees are targeted for removal in 52 acres of Alternative B. However, Alternative B may provide a long-term cumulative benefit by creating young stands for potential future goshawk habitat, and by improving current foraging habitat. In both alternatives, there would be a cumulative benefit to large trees from thinning, which would reduce competition stress and the risk of stand-replacing fire. Large-sized trees would be retained in some entered stands and in unentered areas in both alternatives. Therefore, suitable nest sites should be available after harvest. Both alternatives would retain a 249-acre, unentered old growth corridor. This would retain unaltered some of the best potential goshawk habitat in the proposal area. Return skidding of slash should provide coarse woody debris for small mammals after harvest. Therefore, suitable prey habitat should not be limiting after the harvest. No recent DNRC sales have occurred in the vicinity. Harvey-8-mile was distant and retained much uncut habitat for this species. Thus, no direct or cumulative negative impacts to this species are expected to occur as a result of these alternatives.

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